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AN INITIAL ANALYSIS OF THE NAVY'S
SEA COLLEGE PROGRAM

by

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December 1989

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This thesis is an initial examination of the Navy's Sea College Program (SCP) that was offered as an enlistment incentive in fiscal 1987. The research attempts to determine if the SCP had a positive influence on the number or "quality" of enlistments into the Navy's general detail (GENDET) personnel ratings by examining the records of recruits from fiscal 1983 to 1989. Levels of recruit "quality" were measured during the time the SCP was offered using mean percentile scores on the Armed Forces Qualification Test (AFQT) and scores on SCREEN, a method for estimating an individual's potential for successful service. A literature review was also undertaken to identify existing information on the value of an educational benefit plan as an enlistment incentive. The results of the research show that enlistments into GENDET ratings increased when the SCP was offered, especially for the Fireman rating. In addition, the results reveal that the level of recruit quality significantly improved in the Seaman and Airman ratings. It appears that the SCP was moderately successful in helping the Navy to recruit high-quality youths for assignment to GENDET occupations. Further research on the SCP is recommended.

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An Initial Analysis of the Navy's Sea College Program

by

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requirements for the degree of

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ABSTRACT

This thesis is an initial examination of the Navy's Sea College Program (SCP) that was offered as an enlistment incentive in fiscal 1987. The research attempts to determine if the SCP had a positive influence on the number or "quality" of enlistments into the Navy's general detail (GENDET) personnel ratings by examining the records of recruits from fiscal 1983 to 1989. Levels of recruit "quality" were measured during the time the SCP was offered using mean percentile scores on the Armed Forces Qualification Test (AFQT) and scores on SCREEN, a method for estimating an individual's potential for successful service. A literature review was also undertaken to identify existing information on the value of an educational benefit plan as an enlistment incentive. The results of the research show that enlistments into GENDET ratings increased when the SCP was offered, especially for the Fireman rating. In addition, the results reveal that the level of recruit quality significantly improved in the Seaman and Airman ratings. It appears that the SCP was moderately successful in helping the Navy to recruit high-quality youths for assignment to GENDET occupations. Further research on the SCP is recommended.

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"Commit your works to the Lord,
and your plans will be established." (Prov. 16:3)

I. INTRODUCTION

A. GENERAL

With the introduction of the All-Volunteer Force in 1973, the Services could no longer rely on the mechanism of the draft to bring conscripts and draft-motivated "volunteers" into the enlisted ranks. The Services were required to compete with industry and civilian education institutions on a new and far more aggressive level. Military manpower planners, by necessity, developed innovative and effective programs that were designed to attract sufficient numbers of young men and women into uniformed service.

Concurrently, advances in technology are being applied in the services, especially in the area of combat systems. The "advanced" Talos/Terrier/Tartar air defense systems are being replaced with the "AEGIS" system, incorporating not only anti-air defense but also anti-surface and anti-subsurface weapons into a total ship weapon system. Cruise missile technology has changed the face of surface and strike warfare. The increase in technological applications has led to the need for proportionately more high-quality youths.

To attract these high-quality youths, the services began to realize that this group must be offered a greater inducement to enlist. According to human capital theory, and all other things being equal, the high-quality youths would enlist only if the value of benefits realized by them were greater than the cost to them. Educational benefits programs are one of the most influential enlistment incentives, shown to be effective time and again in numerous surveys of youth and new recruits. Therefore, since the start of the all-volunteer military, much attention has been directed at developing educational programs that would appeal to high-quality youths.

B. THESIS AREA OF RESEARCH

This thesis examines the recruiting of non-prior service (NPS) high-quality males to the U.S. Navy, and the impact that the Sea College Program (SCP) might have had on enlistments.

C. SCOPE OF RESEARCH

Only NPS high-quality males are considered since the Sea College Program was limited to this group. The analysis involves recruitment during fiscal 1984 to 1989. Data

from fiscal 1985 are not included because of non-availability. The Sea College program was offered to new recruits from 1 April 1986 to 4 December 1987.

D. LIMITATIONS OF RESEARCH

This research of the Navy Sea College Program is exploratory in nature since there is a lack of published studies regarding the program. There is, however, a vast repository of published knowledge dealing with the enlistment decision and with educational benefits in particular. The thesis is grounded largely on studies dealing with the Army College Fund. While it may not be possible to extrapolate the findings from the Army College Fund studies and apply them to the SCP, they do provide a framework within which an analysis of the SCP might be conducted.

It was not possible to observe the behavior of recruits who would actually attend college and avail themselves of their benefits. As a matter of fact, some recruits enlisting under the Sea College Program are not expected to complete their initial obligated service until 1990. Since it has not been determined which recruits have applied for and are using their benefits, the study focuses on the quality and numbers of recruits entering the Navy and not with the cost-effectiveness of the program.

Another possible limitation of the research relates to the fact that only accessions are analyzed on an individual level and not the number of new contracts. "Accessions" are enlistees who have reported for basic recruit training, while "new contract enlistees" includes persons who have not yet begun active duty. An analysis that examines new contract enlistments may provide a better indication of the appeal of the SCP as a recruiting tool of young people.

E. RESEARCH QUESTIONS

This research attempts to examine two enlistment issues. The first is to see if the SCP was successful in attracting high-quality youths into the Navy. The second is to see if the SCP had any role as a market-expanding tool. That is, did it provide an enlistment incentive to young people who would not have enlisted otherwise.

The primary research question is whether the Navy Sea College Program had any impact on the number of enlistments of NPS, high-quality males into the programs for which it was targeted.

Secondary research questions are:

- Did the SCP have any significant impact on the quality of recruits entering the targeted programs?

- Did the level of enlistments in any other program change during the time the SCP was offered?
- Did the level of recruit quality in the other programs change during the time the SCP was offered?
- Did the level of enlistments and quality change in any of the ten Department of Defense (DoD) occupational areas over the time the SCP was offered?

F. DATA BASE

The first data base used in this thesis is the Personalized Recruiting for Immediate and Delayed Enlistment System (PRIDE), obtained from Navy Recruiting Command. The PRIDE system is a management and control tool of the recruiting process that allows the Navy to:

- match the qualifications of the accession against the qualifications of the enlistment program;
- control the allocation of training resources by assigning the accession to A school; and
- identify the jobs for which an accession is best suited based on his or her qualifications.

The second data base used is the Enlistment Marketing Analysis, also obtained from Navy Recruiting Command. This time series cross-sectional data file contains economic information from each of the 41 Naval Recruiting Districts (NRDs) collected quarterly for fiscal 1985 to 1988, and was used to model new contract enlistments.

G. ORGANIZATION OF THE THESIS

Chapter II presents the history of the use of educational benefits by the military. The historical application and revision of the G.I. Bill, the implementation of the Veterans' Educational Assistance Program, and the development of the Montgomery G.I. Bill are presented.

Chapter III provides a review of literature that pertains to this research. The review looks at various components of the enlistment decision model, such as advertising, economic factors, and human capital theory. Published studies dealing with educational benefit programs and their results are also examined.

Chapter IV is the first of two chapters dealing with data analysis. In this chapter, an analysis of the PRIDE data base is presented. The details of data file construction, variable construction and modification, and methodology used in the frequency analysis are provided. In addition, results by targeted general detail personnel ratings are presented.

Chapter V is the second chapter concerned with data analysis, and it is limited to a discussion of the results of a multivariate regression of the Enlistment Marketing Analysis data base. The chapter provides information regarding the construction and selection of variables used in the model. The identification and correction of several statistical conditions are discussed. The results of the model are presented and the effect of the SCP on new contract enlistments is examined.

The final chapter presents conclusions concerning the primary and secondary research questions. The policy implications of the findings are then discussed. A number of recommendations for further research are also offered for consideration.

II. A REVIEW OF VETERANS' EDUCATIONAL ASSISTANCE PROGRAMS

A. GENERAL

The current educational assistance program can trace its history back to the original Servicemen's Readjustment Act of 1944, more commonly known as the "G.I. Bill." With the end of World War II approaching, members of the armed forces were of special concern to the national leadership because they would eventually comprise one-quarter of the work force [Ref. 1: p. 1].

The original G.I. Bill was influenced by several major concerns that had been expressed during the closing months of the war. Concerns that were prevalent in late 1944 and recorded by the President's Commission on Veterans' Pensions in 1956, were as follows [Ref. 1: p. 1]:

- The welfare of demobilized veterans thrust upon an economy in the midst of reconversion to peacetime activity.
- The stability of the economy and the possibility of a postwar depression.
- The stability of our political institutions and the effect millions of disgusted veterans might have on the government.
- The educational deficit that had occurred as a result of taking many young people out of schools and sending them to war.
- Runaway demands for pensions and other benefits that might swamp the economy beneath an unbearable load.

The major purposes in creating the more recent successor to the G.I. Bill, the Veterans' Educational Assistance Program (established following the end of the draft), is stated in 38 U.S.C. 1651 as follows [Ref. 2: p. 533]:

- Enhance and make more attractive service in the Armed Forces.
- Extend the benefits of higher education to qualified and deserving young people who might not otherwise be able to afford it.
- Provide vocational readjustment and restore lost educational opportunities to those service men and women whose careers had been interrupted or impeded by active duty after 31 January 1955.
- Aid such persons in attaining the vocational and educational status they might normally have aspired to and attained had they not served their country.

It can be seen from the previous lists of concerns and purposes that a significant change has occurred in how veterans' benefits are employed by the government. This change coincides with the expiration of the draft and the shift to the all-volunteer military force in 1973. Prior to 1973, G.I. Bill educational benefits were offered to compensate the veteran for hardships he or she had endured while serving in the Armed Forces [Ref. 3]. After 1973, educational assistance programs were viewed as a major way of attracting high-quality young men and women to serve in the military [Ref. 4]. The desire to attract high-quality youths increased significantly with the extreme recruiting difficulties faced during the period of the late 1970s [Ref. 5].

This chapter reviews the educational assistance programs that have been offered to service men and women, since 1944. The programs are divided into two groups. The first group incorporates non-contributory plans and the more traditional G.I. Bills. The second group includes the contributory programs. The more recent educational assistance programs also are presented here.

B. NON-CONTRIBUTORY EDUCATIONAL BENEFITS PROGRAMS

1. The World War II G.I. Bill

The Servicemen's Readjustment Act of 1944 (Public Law 346) was enacted by the 78th Congress and became law on 22 June 1944. The bill applied to veterans who served in the Armed Forces between 16 September 1940 and 25 July 1947 [Ref. 6: pp. 19-24]. The program ended, with minor exceptions, on 25 July 1956 [Ref. 2: p. 533].

The bill provided financial support for a minimum of one year of training plus one month for each month of active duty up to forty-eight months. The veteran's tuition, fees, books, and supplies up to a maximum of $500 per school year were paid directly by the Veterans Administration (VA). The veteran could use the tuition allowance at an accelerated rate to cover educational costs if they exceeded the $500 limit. The accelerated rate was one day of entitlement for each $2.10 paid.

The veteran received a monthly subsistence allowance of $50, which was increased to $65 in 1946 and increased again to $75 in 1948. By statute, benefits were curtailed if the veteran's monthly income exceeded $175 ($200 if he or she had dependents). In 1948, the monthly limit was increased to $210 if the veteran had no dependents, $270 for one dependent, and $290 for two or more dependents.

The full-time benefits for college students were based on a minimum of twelve semester hours. Additionally, veterans were permitted to apply benefits to avocational courses; however, this was banned in 1948. Veterans were required to begin their edu-

cation within four years of their release from the service. They were eligible to draw benefits for nine years following discharge.

2. Korean Conflict G.I. Bill

The second G.I. Bill (Public Law 550) was passed by the 82nd Congress and became effective on 20 August 1952 [Ref. 6: p.19]. Veterans who served in the Armed Forces during the "Korean Conflict" were covered by this bill. For the purposes of this legislation, the Korean Conflict was considered to have started on 27 June 1950 and to have ended on 31 January 1955. The ending date for persons who were on active duty on 31 January 1955 was postponed until their first discharge or release from active duty. The veteran could begin his or her education within three years of discharge and had eight years of eligibility. In any event, the program was terminated on 31 January 1965 [Ref. 2: p. 533].

The program did not permit direct payments of education costs as did the World War II G.I. Bill. Instead, the veteran received the benefit as an "education assistance" allowance, or stipend, which was paid directly to the veteran. The purpose of the stipend was to meet, in part, living expenses and educational costs.

The second G.I. Bill provided educational benefits at a rate of one and one-half times the period on active duty. The maximum period of entitlement was generally limited to three years. The minimum number of semester hours required of the Korean veterans was set at fourteen. The veteran received a monthly allowance of $110 if he or she was a full time student with no dependents. If the veteran had one dependent, the monthly allowance was $135 a month; and if the veteran had two or more dependents, the allowance was increased to $160.

3. Cold War G.I. Bill

The Veterans' Readjustment Benefits Act of 1966 (Public Law 89-358) is the basic G.I. Bill for veterans of the post-Korean conflict or "Cold War" period. The law became effective 1 June 1966 and covers service after 31 January 1955. This bill was the first to have as one of its stated purposes the goal of "enhancing and making more attractive service in the Armed Forces of the United States" [Ref. 2: p. 533].

This bill provides education benefits at the same rate (one and one-half) as its predecessor; however, the maximum of thirty-six months of entitlements was available after completion of only 18 months of service. Veterans were eligible to use their benefits if they had received a discharge other than dishonorable and served on active duty for more than 180 days, any part of which may have occurred after 31 January 1955.

The veteran who had been discharged or released from active duty because of a service-connected disability after 31 January 1955 was also eligible for educational benefits. The eligibility in this case was unaffected by length of active duty service.

Servicemen were also eligible to use their benefits while remaining on active duty, provided they had served a minimum of 181 days. Under this bill, veterans were also permitted to use their benefits to complete their high school education without any loss of the basic entitlement.

In 1973, the "Cold War" G.I. Bill provided an allowance of $220 per month to the veteran without dependents. At the other end of the scale, a veteran with two dependents received an allowance of $298 with an increase of $18 for each additional dependent [Ref. 6: p. 21].

The veteran was required to enroll in a minimum of fourteen semester hours to receive the full-time benefits. This requirement could be reduced to twelve semester hours if that was considered the full-time course load by the school. The veteran was eligible for educational assistance for a maximum period of thirty-six months, with nine months of additional entitlements available for pursuing a standard undergraduate degree. The limit on the period of eligibility was eight years.

4. Vietnam-Era G.I. Bill

The Vietnam-Era Veterans' Readjustment Assistance Act of 1974 (Public Law 93-508) became the new G.I. Bill for persons who served on active duty between 31 January 1955 and 1 January 1977 [Ref. 2: p. 534]. As in the case of the "Cold War" G.I. Bill, the veteran must have served on active duty for 180 days or more to be eligible. Likewise, the veteran must have been discharged under conditions other than dishonorable or have been discharged or released from active duty because of a service-related disability.

Veterans are entitled to benefits at the same rate of one and one-half times the period on active duty. Monthly allowances are varied according to the type of education the veteran is receiving (institutional or cooperative) and the time spent in training (full, three-quarter, half, or one-quarter time).

C. CONTRIBUTORY EDUCATIONAL BENEFITS PROGRAMS

1. Post Vietnam-Era Veterans' Educational Assistance Program (VEAP)

The Veterans' Education and Employment Assistance Act of 1976 (Public Law 94-502) established VEAP, which contained several important changes to the previously existing programs. Previous programs were considered to be more or less universal in

their applications; VEAP required that the service member contribute to his or her entitlement. The Department of Defense (DoD) matches the members' contribution at a two-to-one dollar ratio. The maximum total contribution by a service member is $2,700. With matching funds, the maximum benefit available to the member is $8,100 (or $2,700 from the individual plus $5,400 from the government).

Veterans' educational benefits under this program served several purposes. One purpose was to promote and assist the newly- established All-Volunteer Force by attracting qualified men and women to serve in the military. Another purpose was, again, to assist service members and veterans in obtaining education they may not otherwise be able to afford [Ref. 2: p. 535]. A third purpose was to provide an educational assistance program that would help assure an effective military force while reducing future expenditures through the G.I. Bill [Ref. 4].

The veteran or member became entitled under the program if he or she entered military service on or after 1 January 1977 and became a contributor to the program [Ref. 2: p. 535]. Initially, the contributions could be made by payroll deduction on a monthly basis at a rate that varied from $50 to $75. The payment schedule was changed by Congress in fiscal 1981. Members were allowed to make a lump-sum payment or make monthly contributions of between $25 and $100. The aggregate contribution by the member remained limited to $2,700 [Ref. 7: p. 18].

Benefits accrue at a rate of one-to-one--one month of assistance for each month of contributions. The maximum benefit available is to be disbursed over thirty-six months. For the member who had contributed the maximum of $2,700 in a thirty-six month period, this provides a monthly benefit of $225 for three years.

2. The Department of Defense Educational Assistance Test Program of 1981

The Department of Defense Authorization Act of 1981 established an Educational Assistance Test Program. The purpose of the program was to evaluate the effectiveness of educational benefits as enlistment incentives for youths. This program was created partly in response to the growing concern within Congress in attracting and recruiting "quality youths" for the military [Ref. 2: pp. 536-537]. The test program consisted of three different plans: the Tuition/Stipend Plan, the Loan Replacement Plan, and the Noncontributory VEAP Program [Ref. 2: p. 536-537].

The test program also resulted from disappointment with the performance of VEAP. This disappointment generally centered on the following three aspects [Ref. 7: pp. 14-17]:

- a lower-than-expected participation rate (participation rates were unevenly distributed among the Services);
- a considerably higher-than-expected disenrollment rate (about one-third of the program contributors had disenrolled by the end of fiscal 1981); and
- less-than-expected recruitment rates of higher qualified youth.

The Tuition/Stipend program offered benefits and a living allowance up to a maximum of $15,600. The program was available to members enlisting or reenlisting for service on active duty after 30 September 1980 and before 1 October 1981. The member was required to have served at least twenty-four months of his or her service obligation to become eligible for the entitlement. Also, the member had to have been separated from the military to receive the benefit. At the first reenlistment following the enlistment which established eligibility, the member could decide to:

- cash in the benefits at 60 percent of their value; or
- transfer the benefits to a dependent; or
- retain the benefit.

If the benefits were not cashed in, the member could use them or transfer them to a dependent for a period of ten years following separation from service.

The Loan Repayment Plan authorized DoD to repay Guaranteed Student Loans or National Direct Student Loans for certain members who were enlisting in the Ready Reserve or the active service after 30 September 1980 and before 1 October 1981. To qualify for the benefits, the member must have enlisted in a qualifying occupational specialty, have successfully completed one year of service, and met criteria as established by the Secretary of Defense. The loans could be repaid at the greater of a rate of 33.3 percent or $1,500 of the outstanding principal for every year of qualifying service. The qualifying end date of 1 October 1981 was extended to 1 October 1983 by the Department of Defense Authorization Act of 1982 (Public Law 97-86).

The Noncontributory VEAP plan is essentially the same as the modified VEAP plan except that the government provides 100 percent of the $8,100 benefit. Members who enlisted between 30 September 1980 and 1 October 1981 and who have elected to participate in VEAP are eligible for benefits, subject to the selection criteria of the Secretary of Defense.

3. The Army College Fund

The Army College Fund, also known as Ultra-VEAP, is an extension of the basic VEAP program. The program authorized DoD to make additional contributions

as the "Secretary deems necessary or appropriate to encourage persons to enter or remain in the Armed Forces. . . ." [Ref. 2: p. 535]. The Army College Fund is intended to fulfill the following principal objectives [Ref. 3]:

- to act as a special enlistment incentive for the Army;
- to increase the quality of Army recruits;
- to raise the participation in the basic VEAP program; and
- to improve civilian job prospects for soldiers through enhanced post-service education and training.

The Army began experimenting with increased educational benefit bonuses, or "kickers," in January 1979 in the Multiple Option Recruiting Experiment [Ref. 3]. The program was available to non-prior service (NPS) enlisted personnel who chose an authorized Military Occupational Specialty (MOS). These MOS were generally of a "critical" or "hard-to-fill" nature and required a more intensive recruiting effort. The recruit must have scored in the 50th percentile or above on the Armed Forces Qualification Test (AFQT). (This score equates to an AFQT category IIIA or above.) The recruit also had to possess a high school diploma.

The results of the experiment on recruiting were inconclusive with respect to the desirability of a more general program, such as the G.I. Bill, or the cost effectiveness of any particular program. However, the test showed that the large kickers had a significant impact on recruiting [Ref. 8]. This, together with the extreme difficulty of Army recruiting in fiscal 1981, led to the establishment, nationwide, of the Army College Fund in 1982 [Ref. 3].

The original Army College Fund provided an increased benefit of $15,000 for the recruit who enlisted for a two-year tour. The maximum additional benefit of $20,000 was available for certain recruits enlisting for a four-year term. These benefits are in addition to the $8,100 available to all recruits under the VEAP program.

The Army College Fund recruit was required to possess a high school diploma and have scored at or above the 50th percentile on the AFQT. The recruit must also have enlisted in a critical or hard-to-fill MOS and must contribute $2,700 to the VEAP program.

Several recent legislative changes have affected the Army College Fund. The most notable of these changes are those brought about by the enactment of the Montgomery G.I. Bill, which is discussed in the next section. The Army College Fund

is still used as a means of attracting high-quality youths to enlist in the Army's hard-to-fill and critical occupational specialties.

4. The Montgomery G.I. Bill

The Veterans' Educational Assistance Act of 1984 was enacted as Title VII of the Department of Defense Authorization Act of 1985 (Public Law 98-525), and was approved on 19 October 1984. Title VII establishes a DoD-VA All-Volunteer Force Educational Assistance Program for active duty and reserve personnel and veterans. A DoD Education Benefits Fund was established to be administered by the Treasury Department [Ref. 9].

The stated purposes of the All-Volunteer Force Educational Assistance Program are as follows [Ref. 2: p. 537]:

- to provide a new educational assistance program to assist in the readjustment of members of the Armed Forces to civilian life after their separation from military service;
- to promote and assist the All-Volunteer Force and the Total Force Concept of the Armed Forces by establishing a new program of educational assistance based upon service on active duty or a combination of service on active duty and in the Selected Reserve (including the National Guard) to aid in the recruitment and retention of highly qualified personnel for both the active and reserve components of the Armed Forces; and
- to give special emphasis to providing educational assistance benefits to aid in the retention of personnel in the Armed Forces.

The Montgomery G.I. Bill applies to all enlistees who first enter active duty on or after 1 July 1985. Unlike the VEAP program, where the enlistee had to elect to participate in the program to qualify for benefits, the new G.I. Bill requires that enlistees must specifically elect not to participate in the program [Ref. 2: p. 538]. The monetary cost to the individual is $1,200, which is non-refundable. This is a decrease from the $2,700 contribution required of the VEAP program. A recruit participating in the Montgomery G.I. Bill is not eligible to participate in the VEAP program.

The Montgomery G.I. Bill provides a total basic benefit of $10,800, which represents a government contribution of $9,600 per individual, an increase from the $5,400 contribution of the VEAP program. The educational benefit is disbursed at the rate of $300 a month for service members or veterans who serve on active duty for three years. The benefits are disbursed at a rate of $250 per month for active duty service of two years. The benefits are payable over a maximum period of thirty-six months.

The Secretary of Defense is authorized under this Act to increase the basic monthly benefit by $400 to recruit individuals into critical or hard-to-fill occupational

specialities. A supplemental monthly benefit of $300 is available to members who complete the initial obligated service required for the basic benefit and who reenlist in the service. The member may reenlist in the service on either active duty for a period of five years or on active duty for two years and in the Selected Reserve for four years. The supplemental benefits may be increased up to an additional $300 on a "targeted basis" [Ref. 2: p. 538].

5. The Navy Sea College Program

The Navy Sea College Program (SCP) was developed in 1986 and was modeled on the Army College Fund. In a posture statement to the House Armed Services Committee, then Secretary of the Navy, John F. Lehman, Jr., stated [Ref. 10]:

> The newly begun Sea College Program will target the high-quality youth market for active naval service to broaden the quality base of enlisted personnel, attract high-quality recruits for non-technical ratings and provide a stable input of fleet experience general detail non-rated personnel (GENDETS) to the Ready Reserve.

Recruiting for the Sea College Program began on 1 April 1986 [Ref. 11]. The recruits were enlisted into the Delayed Entry Pool (or DEP) for entry to active service beginning 1 October 1987. The program was authorized to allow participation by 3,000 new recruits for fiscal 1987. Recruiting into the Sea College Program ended on 4 December 1987 [Ref. 12]. Those Sea College recruits who had enlisted into the DEP and were scheduled to enter active service after 31 December 1987 were eventually authorized to enter active duty under the terms of their original enlistment contract, which included participation in the SCP [Ref. 13].

In program guidance provided to the Navy Recruiting Command, the Commander stated that the primary purpose of the program was to target high-quality youth for active naval service [Ref. 14]. Specifically, the Commander noted the following objectives:

- To broaden the quality base of enlisted personnel.
- To provide increased input of fleet experienced seamen, airmen, and firemen into the Naval Reserves.

The memorandum also saw the Sea College Program as an opportunity to gain entry into high-quality high schools, which had been previously resistant to recruiting by the Navy. Another possible benefit of the program was its possible appeal to minority applicants who had bypassed Navy recruiters to talk with the Army, supposedly lured by the Army College Fund.

The program derived its authority from the Montgomery G.I. Bill which permitted the Secretary of Defense to increase the amount of the basic educational benefit for individuals in a critical or hard-to-fill specialty. The application of the program to GENDETS (or GENeral DETail personnel, including seamen, airmen, and firemen) was justified because GENDETS had been a hard-to-fill rating since 1983 [Ref. 15]. GENDETS were also considered to possess skills which were critical to at-sea operations. The fact that the recruit who enlisted under the program did not receive technical or class "A" schooling, did not detract from the critical nature of the skills he or she possessed.

The program was available to both men and women in the same ratio as the Navy's Male/Female Accession Plan. The recruit was required to have earned a high school diploma and score in AFQT category I or II. This represented a marked difference from the Army College Fund requirement of a score in AFQT category IIIA or higher (the upper 50th percentile). The recruit must also have enlisted in the military for the first time and be between the ages of 17 to 22 years [Ref. 14].

The recruit was required to have enlisted for a period of eight years in the Seaman, Fireman, or Airman Apprentice ratings, as dictated by the needs of the Navy. The enlistment commitment consisted of two years on continuous active duty, four years in the Selected Reserve, and two years in the Individual Ready Reserve. The Sea College Program entitlement is contingent upon satisfactory completion of the annual active duty for training (ACDUTRA) requirement. Failure to fulfill this requirement will result in the recall of the member to active duty for up to forty-five days.

The recruit would attend basic training for eight weeks and then apprenticeship training for four weeks. Enlistees would not attend class "A" schools, but, would be assigned to a ship or squadron as apprentices. At this point, the enlistee was to receive on-the-job training (OJT) to acquire the necessary skills that would relieve the shortage at the specific command.

The recruit is required to participate in the Montgomery G.I. Bill by contributing the non-refundable $1,200 within the first twelve months of enlisting. The benefits accrue at a rate of $522 per month--$300 per month in basic benefits and $222 in kickers [Ref. 16: p. 4-IV-2]. The member who is eligible for the maximum benefit of approximately $18,800 would begin collecting benefits upon completion of two years of continuous active duty. The member will qualify for the maximum benefits if he or she meets the following requirements:

- completes two years of continuous active duty followed by four years duty in the Selected Reserves; and
- reenlists or extends and remains on continuous active duty for at least forty-eight months from the initial enlistment date.

The enlistee will become ineligible for benefits under the Sea College Program if he or she receives an Entry Level Separation (ELS). The ELS is a separation awarded to a member who has less than 180 days of service. The enlistee will also become ineligible under this program if he or she receives a discharge that is other than honorable following two years of continuous active duty and four years of duty in the Selected Reserve or after thirty-six months of continuous active duty [Ref. 16: p. 4-IV-3].

III. LITERATURE REVIEW

A. GENERAL

A significant number of studies have been published regarding the impact of educational test programs, as well as the impact of educational expectations of young men, on enlistment decisions. However, research in this area should by no means be considered exhaustive. In the case of the Navy's Sea College Program, the author has been unable to find a published work dealing with this particular educational benefit plan.

The factors that affect military labor supply can be categorized into the following major groups [Ref. 17 : p. 159]:

- the tangible, or measurable, aspects of military service such as direct compensation, value of benefits, etc.;
- the dissemination of recruiting and enlistment information to the market;
- the conditions of the civilian economy;
- the population base encountered by military recruiters; and
- the individual's preference for military service.

Cooper states that, while military pay is a significant factor of the tangible aspects of military enlistments, other factors are also important. Such factors as length of enlistment, choice of military occupation, and the amount of enlistment bonus will also influence the labor supply. The offer of educational benefits as an inducement to enlist could be included in this category. The elements of enlistment tangible aspects are discussed in the sections dealing with educational benefits, educational expectations, and economic factors.

According to Cooper, a second category influencing the enlistment propensity of an individual is the dissemination of recruiting and enlistment information and policies. This category not only includes the effect of the number of production recruiters assigned to the field, but it also encompasses the effects of media advertising on a national, regional, and local basis, as well as direct mailings and canvassing. The purpose of the recruiting activity may not be specifically to recruit, but rather to inform. The elements concerning the dissemination of recruiting and enlistment information to the market are discussed in the section dealing with advertising and the military market.

A third category that influences enlistment supply is the market conditions in the civilian sector that the prospective recruit must face. These factors are generally beyond

the control of military manpower planners, and include unemployment rates, civilian wage rates, and federal and state employment programs. These economic factors are discussed in the section dealing with determinants of enlistment.

A fourth category discussed by Cooper is the population base from which the military must obtain contracts. Given an increasingly smaller population base, the number of enlistments would be expected to decrease. Studies that have attempted to estimate the enlistment population supply base are presented.

A final category that influences enlistment supply, according to Cooper, is the personal "taste" of an individual for military service. This personal taste includes such influences as job content and satisfaction with working conditions. For the purposes of this research, taste is discussed only as it applies to the educational expectations of youth.

B. CHAPTER ORGANIZATION

This chapter reviews literature related to the subject of this research. The review is divided into six sections, because each section describes a factor of the enlistment supply environment. In amplification of the five broad categories mentioned by Cooper, an additional section is presented dealing with the issue of manpower "quality." The remaining sections of this chapter are:

- The Issue of Quality.
- Estimating Enlistment Supply Population Base.
- Educational Expectations of Potential Recruits.
- The Effects of Educational Benefits on Enlistments.
- Other Determinants of Enlistments.
- Advertising and the Military Market.

C. THE ISSUE OF QUALITY

The continued enlistment of high-quality youths, (high school diploma graduates who have scored above the 50th percentile on the AFQT), has been the goal of military manpower planners as well as Congress. When considering the Veteran's Education and Employment Assistance Act, the Senate Committee on Veterans' Affairs observed that terminating the G.I. Bill without a suitable alternative would impair the Services' ability to attract military recruits. This concern for quality was partially responsible for the creation of Educational Assistance Test Program, included in the DoD Authorization Act of 1981 [Ref. 2: p. 536].

According to Cooper [Ref. 17: pp. 128-136], the quality of a recruit is not readily measured nor precisely defined. However, quality has been interpreted in terms of AFQT category and educational achievement. The use of the AFQT percentile score as a measure of quality is confirmed by Eitelberg et al. in a report that states that the AFQT was designed as a screening device [Ref. 18: p. 16]. Educational achievement is measured as the earning of a high school diploma as opposed to earning a General Educational Development (GED) certificate or not holding a diploma at all. The value of educational achievement to military manpower planners is in its correlation to the recruit's potential for adaptability to military life. The desire for quality has arisen from several principal concerns:

- performance on the job;
- trainability for occupational assignment; and
- potential disciplinary or motivational problems.

The AFQT was developed and introduced specifically as a screening device in July 1950 [Ref. 18: pp. 16-18]. The purpose of the AFQT was to measure the

> examinee's general mental ability to absorb military training within a reasonable period of time and provide a uniform measure of the enlistees usefulness to the service.

AFQT scores are recorded in percentiles and are arranged according to five categories. Sometimes, AFQT categories III and IV are further divided into two and three subcategories, respectively. Persons who score in AFQT category V are ineligible for military service; and the proportion of new recruits who score in category IV are controlled by Service policy and Congressional restrictions. Table 1 on page 19 provides the percentile ranges for AFQT categories I through V [Ref. 17: p. 127].

Table 1. AFQT CATEGORIES ARRANGED BY PERCENTILE SCORE RANGES

AFQT Category	Percentile Score Range
I	93 and greater
II	65 - 92
III A	50 - 64
III B	31 - 49
IV A	21 - 30
IV B	16 - 20
IV C	10 - 15
V	9 or less

Source: Cooper, R.V.L. *Military Manpower and the All-Volunteer Force*

The impact of high-quality enlistments has been documented in several studies and has substantiated the concerns expressed by Cooper in 1977. Thurman [Ref. 5] observed that the percentages of soldiers who received adverse discharges or who were discharged from the Army prior to completing their first enlistment term was significantly lower for individuals possessing a high school diploma than for those not possessing a diploma. The percentage of soldiers who received either adverse discharges or who were separated because of attrition was also lower for those in the upper AFQT categories.

The observations made by Thurman are corroborated in a study conducted by Buddin. Buddin used data from a matched file of the 1979 Survey of Personnel Entering Active Duty and the Services' Enlisted Master and Loss Files to examine personnel attrition within the first six months of military service [Ref. 19: p. 1]. The purpose of the study was to assess how background characteristics, such as prior work experience and satisfaction with initial military assignment, affect attrition behavior.

Buddin found that high school graduates were half as likely to separate from the military within the first six months of an enlistment as were non-high school graduates [Ref. 19: p. 30]. Another finding was that the AFQT score had a statistically significant but quantitatively small negative effect on attrition rates [Ref. 19: p. 1].

Van Doren conducted thesis research into the issue of supply and demand for high-quality Navy recruits. He found that the attrition rates for high school diploma graduates were lower than the rates for non-high school graduates who enlisted in fiscal 1974 [Ref. 20: p. 11].

There is evidence of a relationship between the quality of recruits and their performance on the job. Van Doren [Ref. 20: p. 12] cites a study by Horowitz and Sherman of the Center for Naval Analyses which investigated the impact of the quality of sailors aboard certain surface ship classes. Horowitz and Sherman found that when the quality of personnel was compared to the material condition of the ship, the relatively higher-quality personnel were generally considered more valuable on those ships with more complex equipment.

Marcus and Quester conducted a study that was an initial investigation into the determinants of individual productivity in the military. They used survey data from the supervisors of Navy first-term enlisted personnel and tried to explain the factors causing recruits to learn faster. The factors they found significant were [Ref. 21: p. 3]:

- ability as measured by AFQT score;
- schooling as measured by being a high school graduate;
- job experience or work history; and
- time on job.

A study was conducted by Scribner et al. to analyze tank crew range firing performance to see if a relationship existed between performance and the tank crew member's individual characteristics [Ref. 22]. The researchers found that tank crews with higher AFQT scores performed substantially better than tank crews with lower AFQT scores. However, the authors were unable to make any firm conclusions regarding the influence that the level of civilian education had on tank crew performance. [Ref. 22].

While the concerns of job performance, trainability, and motivational/disciplinary problems will ensure that the demand for high quality recruits will not slacken, there is another concern that will reinforce this level of demand. That concern is technology. The Navy of today is more technologically complex and advanced than the Navy of just ten years ago. There does not seem to be any indication that this trend will change. As Hitch and Mc Kean state [Ref. 23: pp. 243-244]:

> There can be no question regarding the crucial importance of promoting military technology in the nuclear era. Any power that lags significantly in military technology, no matter how large its military budget or how efficiently it allocates resources is likely to be at the mercy of a more progressive enemy. . . . Keeping ahead in the technological race is not in itself a guarantee of security in these circumstances; it remains essential to incorporate the technology in operational hardware ('forces in being') and to deploy them and use them with skill and intelligence. But no amount of production, skill, and intelligent use can compensate for technological inferiority.

Murray [Ref 24] discussed the impact that the expansion of force structure and technology have on manpower requirements. He stated that the training base for certain ratings had increased while the size of the fleet had been shrinking. In other words, the training requirements of the fleet measured in terms of the length of training, has increased while the size of the fleet has generally decreased since 1945. Table 2 shows the changes in the training base expressed as manweeks per unit (ship or aircraft squadron) for various technical ratings.

It can be seen from the table that the requirement for technical training has steadily increased over the last four decades. This change is particularly notable for the Data Systems Technician rating. The changes in training base requirements for this group of technicians have occurred in just the last 20 years.

Table 2. CHANGES IN NAVY TECHNICAL TRAINING REQUIREMENTS IN MANWEEKS PER UNIT, 1950S THROUGH 1980S

Technical Skill Area	1950s	1960s	1970s	1980s
Sonar Technician, Surface (STG)	63	504	718	827
Data Systems Technician (Surface)	0	0	500	827
Machinery, Electronics, and Weapons Technicians (Surface)	810	3,367	4,671	6,534
Aviation Maintenance Ratings	573	785	1,050	1,140
Submarine Technical Ratings	1,675	4,300	6,400	16,846

Source: Murray, R.J. *Technology and Manpower: Navy Perspective*

Murray also presents evidence that technology is helping the Navy economize on manpower. The recent design of ships has been to increase the capability of the ship by installing new weapons and/or sensor systems in a larger hull, thus increasing the ship's displacement. At the same time, the size of the ship's crew has been decreasing. Table 3 on page 22 shows the extent of this trend for selected ship classes. The trend is most evident when contrasting guided missile destroyers (DDGs).

Table 3 shows that the Charles F. Adams class DDG, launched in 1959, displaces 3,370 tons and requires a crew of 396 officers and men. This yields a ratio of manpower per ship ton of about 0.12. On the other hand, the Kidd class DDG, launched in 1979,

displaces more than twice as much as the Adams class DDG and yet requires 16 percent fewer crew members. The manpower per ship ton ratio for the Kidd class DDG is about 0.04.

Table 3. CONTRASTS OF CHANGES IN SHIP DISPLACEMENT WITH RESPECT TO CHANGES IN CREW SIZE AND MANPOWER PER SHIP TON

Ship Class	Year Launched	Displacement in Tons	Crew Size	Manpower per Ship Ton
Destroyers:				
Fletcher	1942	2050	249	.12
Spruance	1973	7300	353	.05
Guided Missile Destroyers:				
Charles F. Adams	1959	3370	396	.12
Kidd	1979	8140	332	.04
Frigates:				
Brooke	1963	2640	325	.12
Perry	1976	3000	200	.07
Cruisers:				
Albany	1945	13700	1000	.07
Ticonderoga	1981	8910	349	.04
Aircraft Carriers				
Midway	1944	51000	2522	.05
Nimitz (nuclear)	1972	81600	3177	.04
Submarines:				
Guppy	1944	1870	84	.04
Los Angeles (nuclear)	1974	6000	132	.02
Amphibious:				
LST-511	1943	1653	115	.07
LST-1179	1969	4500	259	.06

Source: Murray, R.J. *Technology and Manpower: Navy Perspective*

Murray concluded that technology more than force structure will determine which navy will be able to dominate potential adversaries. Given the changing and complex Navy force structure, the demand for high-quality recruits will not be diminished.

D. ESTIMATING THE EFFECT OF THE POPULATION BASE ON ENLISTMENT SUPPLY

An important determinant in the manpower supply equation is the population base from which recruiters must obtain contracts. Since about 1980, the population base of 17- to 21-year-old men has been declining. The pool of male youths is expected to reach a low in the mid-1990s when it will be at approximately the same level as in 1966 [Ref. 25: p. 82-83]. Figure 1 on page 24 presents a graphical description of the shrinking population base.

Fernandez attempted to forecast enlisted supply quantities [Ref. 26]. He felt that, since the U.S. was facing a decline in the size of the population cohorts, it was necessary for military manpower planners to be able to forecast supply accurately. He developed models for three conditions of economic growth within two differing environments.

The three cases of economic growth were categorized "high," "moderate," or "low." High growth was considered to be during a period of decreasing unemployment rates, while moderate growth was during a period of more modest decreasing unemployment rates. Low growth occurred when there existed a fairly consistent unemployment rate.

In 1978 there was a decline in the enlistment levels into all of the Services. The two differing environments, designated case "A" and case "B", were designed to account for the factor that caused the low enlistment level in 1978. Case "A" represented the environment in which the factor that caused the low enlistment level would be reversed. Case "B" represented the environment in which the factor would not be reversed.

Fernandez's model consisted of four variables: military pay, civilian pay, recruiters, and the unemployment rate. Military pay was the compensation that the enlistee, who had less than two years of service, received during his or her first year. Civilian pay was the seasonally-adjusted average weekly earnings in the total private economy. The recruiters variable was the total number of production recruiters, or those who were assigned monthly quotas, in the field. Finally, the unemployment rate variable reflected the seasonally-adjusted unemployment rates for 16- to 19- year old males. The estimates made by Fernandez are provided in Table 4 on page 25 to Table 9 on page 29. The projections are made by fiscal year and are divided according to AFQT categories.

The tables show that there is a decline in the projected enlistment supply of AFQT categories I through IIIB recruits. There is a nominal increase in fiscal 1989; however, the projected supply decreases again in fiscal 1990. The projected supply estimates for the case "A" environment are higher than those for the case "B" environment under each

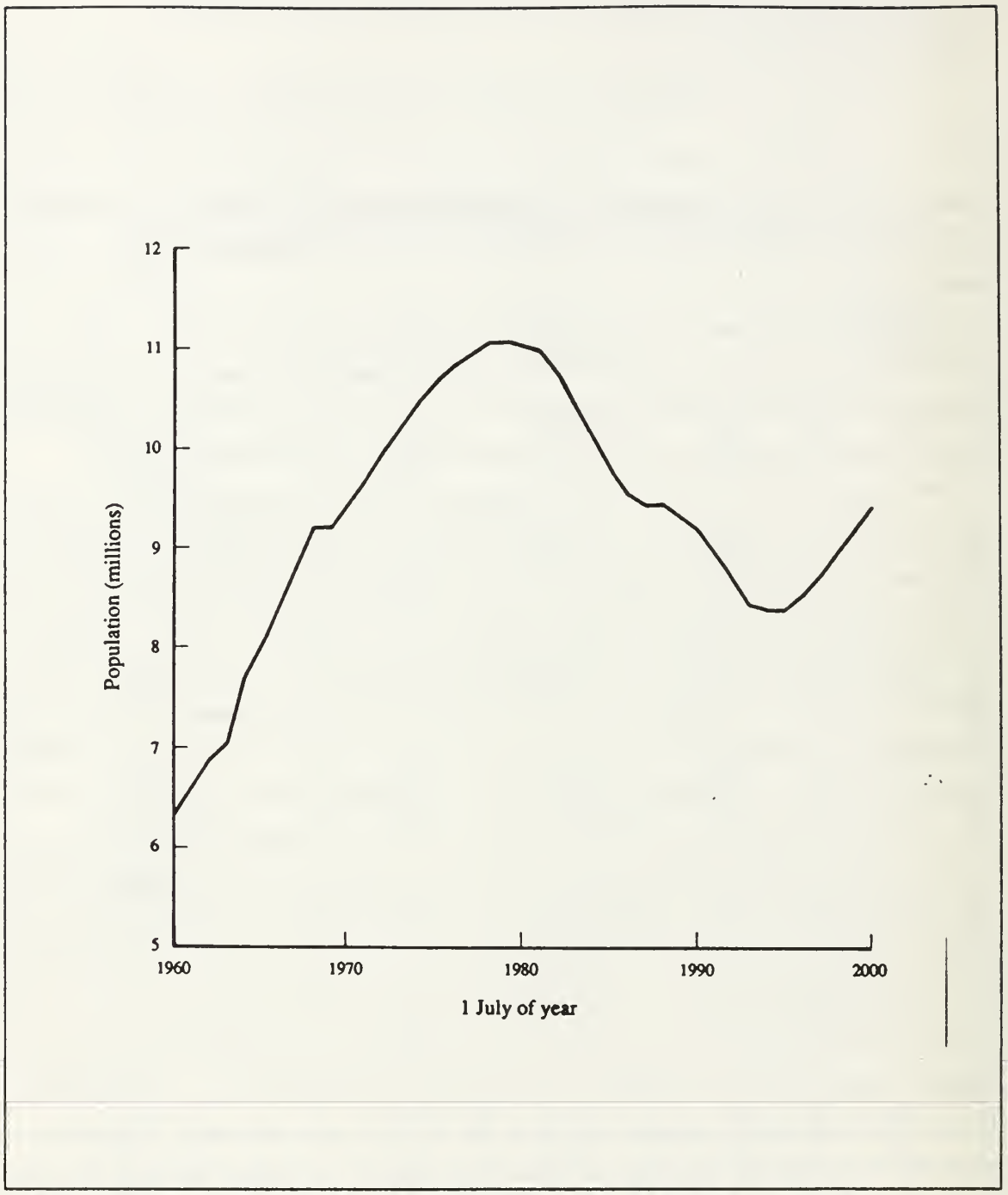

Figure 1. The Decline in the Population of 17- to 21-Year-Old Males from 1960 to 2000

Source: Lockman, R.F. *Trends and Issues in U.S. Navy Manpower*

condition of growth. This is because the factor which caused the low enlistment levels in 1978 was reversed and had no effect in the case "A" environment.

In Tables 4 through 6, Fernandez estimated that the supply of AFQT category I and II recruits would decline by about 31 percent in the case "A" environment for a high economic growth condition. The decline in supply in the same environment, but for a low economic growth pattern, is about 15 percent. The reason for the smaller decline in the second instance is that the civilian unemployment rate is assumed to remain fairly consistent; therefore, military service will be perceived by some youths as a reasonable alternative to civilian employment. These youths would not have necessarily enlisted if there was a decrease in the civilian unemployment rate, characterized by the high economic growth condition.

Table 4. NAVY ENLISTMENT SUPPLY PROJECTION FOR CASE A AND HIGH ECONOMIC GROWTH BY AFQT CATEGORY FROM FISCAL 1982 TO FISCAL 1990

Fiscal Year	AFQT Categories			
	I & II	IIIA	IIIB	I through IIIB
1981	27,676	14,748	13,848	56,272
1982	25,478	13,364	13,234	52,076
1983	22,689	11,665	11,741	46,095
1984	20,968	10,736	10,197	41,901
1985	20,165	10,423	9,576	40,164
1986	19,638	10,159	9,323	39,120
1987	19,413	10,046	9,222	38,681
1988	19,499	10,092	9,268	38,859
1989	19,522	10,102	9,275	38,910
1990	19,092	9,875	9,061	38,028

Source: Fernandez, R.F. *Forecasting Enlisted Supply: Projections for 1979-1990*

Table 5. NAVY ENLISTMENT SUPPLY PROJECTION FOR CASE A AND MODERATE ECONOMIC GROWTH BY AFQT CATEGORY FROM FISCAL 1982 TO FISCAL 1990

Fiscal Year	AFQT Categories			
	I & II	IIIA	IIIB	I through IIIB
1981	28,075	14,983	13,845	56,903
1982	27,029	14,294	13,539	54,862
1983	25,685	13,531	12,813	52,029
1984	24,064	12631	11,991	48,686
1985	22,904	11,996	11,181	46,081
1986	22,300	11,723	10,817	44,840
1987	22,042	11,590	10,698	44,330
1988	22,137	11,643	10,749	44,529
1989	22,166	11,656	10,759	44,581
1990	21,680	11,396	10,515	43,951

Source: Fernandez, R.F. *Forecasting Enlisted Supply: Projections for 1979-1990*

Table 6. NAVY ENLISTMENT SUPPLY PROJECTION FOR CASE A AND LOW ECONOMIC GROWTH BY AFQT CATEGORY FROM FISCAL 1982 TO FISCAL 1990

Fiscal Year	AFQT Categories			
	I & II	IIIA	IIIB	I through IIIB
1981	28,323	15,123	13,839	57,285
1982	27,995	14,892	13,714	56,601
1983	27,398	14,580	13,491	55,469
1984	26,378	14,028	12,992	53,398
1985	25,466	13,544	12,545	51,555
1986	24,785	13,184	12,213	50,182
1987	24,496	13,033	12,076	49,605
1988	24,601	13,091	12,133	49,825
1989	24,635	13,107	12,146	49,888
1990	24,098	12,817	11,872	48,787

Source: Fernandez, R.F. *Forecasting Enlisted Supply: Projections for 1979-1990*

In Tables 7 through 9, Fernandez estimates the supply of AFQT category I and II recruits will decline from fiscal 1981 to 1990. His estimate of 21,960 AFQT category I and II recruits in fiscal 1981 is about 21 percent lower than his estimate of the same category and fiscal year in the case "A" environment. The lower estimate in the case "B" environment is due to the effect of the factor which caused the decline in enlistment levels in 1978. In the case "B" environment this effect is not reversed.

Tables 7 through 9 show that there is a decline in the projected supply of AFQT category I and II recruits from fiscal 1981 to 1990. The decline is about 34 percent for the high economic growth condition. The low economic growth condition experiences a decline of 15 percent.

The rate of projected enlistment supply decline from fiscal 1981 to 1990 is the same for both cases under a low economic growth condition. However, the projected total number of AFQT category I and II recruits for fiscal 1981 in case "B" is about 21 percent lower than the comparable estimate in case "A."

Table 7. NAVY ENLISTMENT SUPPLY PROJECTION FOR CASE B AND HIGH ECONOMIC GROWTH BY AFQT CATEGORY FROM FISCAL 1982 TO FISCAL 1990

Fiscal Year	AFQT Categories			
	I & II	IIIA	IIIB	I through IIIB
1981	21,960	14,748	13,848	50,556
1982	20,222	13,364	13,234	46,820
1983	17,799	11,665	11,741	41,205
1984	16,136	10,736	10,197	37,069
1985	15,415	10,423	9,576	35,414
1986	15,012	10,159	9,323	34,494
1987	14,843	10,046	9,222	34,111
1988	14,911	10,092	9,268	34,271
1989	14,926	10,102	9,275	34,303
1990	14,592	9,875	9,061	33,528

Source: Fernandez, R.F. *Forecasting Enlisted Supply: Projections for 1979-1990*

Table 8. NAVY ENLISTMENT SUPPLY PROJECTION FOR CASE B AND MODERATE ECONOMIC GROWTH BY AFQT CATEGORY FROM FISCAL 1982 TO FISCAL 1990

Fiscal Year	AFQT Categories			
	I & II	IIIA	IIIB	I through IIIB
1981	22,250	14,983	13,845	51,078
1982	21,452	14,294	13,539	49,285
1983	20,302	13,531	12,813	46,646
1984	18,953	12,631	11,991	43,575
1985	17,932	11,996	11,181	41,109
1986	17,431	11,723	10,817	39,971
1987	17,233	11,590	10,698	39,521
1988	17,309	11,643	10,749	39,701
1989	17,329	11,656	10,759	39,744
1990	16,945	11,396	10,515	38,856

Source: Fernandez, R.F. *Forecasting Enlisted Supply: Projections for 1979-1990*

Table 9. NAVY ENLISTMENT SUPPLY PROJECTION FOR CASE B AND LOW ECONOMIC GROWTH BY AFQT CATEGORY FROM FISCAL 1982 TO FISCAL 1990

Fiscal Year	AFQT Categories			
	I & II	IIIA	IIIB	I through IIIB
1981	22,432	15,123	13,839	51,394
1982	22,206	14,892	13,714	50,812
1983	21,760	14,580	13,491	49,831
1984	20,952	14,028	12,992	47,972
1985	20,229	13,544	12,545	46,318
1986	19,690	13,184	12,213	45,087
1987	19,464	13,033	12,076	44,573
1988	19,549	13,091	12,133	44,773
1989	19,573	13,107	12,146	44,826
1990	19,142	12,817	11,872	43,831

Source: Fernandez, R.F. *Forecasting Enlisted Supply: Projections for 1979-1990*

Goldberg also attempted to determine the quantity of enlisted supply in a study published in [Ref. 27]. In this study, the enlistment supply of high school graduates was estimated as a function of the following:

- relative military-to-civilian pay;
- unemployment rate;
- government youth programs;
- male population;
- percentage black population; and
- number of recruiters assigned for each service.

The relative military pay is the pay earned by an enlistee in pay grade E-1 with less than two years of service divided by the annual full time earnings of an 18- year-old civilian man. The unemployment variable reflected the unemployment rate for all civilians as opposed to that for the 17- to 18- year old age group. The youth programs variable was included to account for the effect of the Labor Department Employment and Training Administration's expenditures for youth programs and counter-cyclical programs.

The male population variable reflected the 17- to 21- year old population within the individual Naval Recruiting District (NRD), and the NRDs percentage of black population is reflected in the model as well. VEAP is a dichotomous dummy variable equal to zero in 1976 and prior years and one in 1977 and later; VEAP was introduced in 1977. Finally, the effect of the number of recruiters of each service is included as an explanatory variable in the model.

Goldberg found that the loss of the G.I. Bill in 1977 caused a large decline in the enlistment supply. This finding appears to be the cause of the 1978 decline in enlistment levels encountered by Fernandez in his study and which defined his case "A" and case "B" environments. Another finding of Goldberg was that a G.I. Bill similar to that of the World War II or Vietnam eras was more expensive when compared to increased enlistment bonus levels, increased number of recruiters, and increased advertising expenditures. Table 10provides forecasts of enlistment supply for high school graduates for fiscal 1981 through fiscal 1987 by AFQT categories.

Table 10. FORECAST OF ENLISTMENT SUPPLY OF HIGH SCHOOL GRADUATES (HSG) BY AFQT CATEGORY FOR FISCAL 1982 TO FISCAL 1987

Fiscal Year	AFQT Categories		All HSGs
	I to II	I to IIIA	
1982	30,500	44,700	78,600
1983	28,700	42,100	73,200
1984	27,500	40,200	69,400
1985	27,100	39,600	68,400
1986	26,800	39,200	67,600
1987	26,600	38,900	67,100

Source: Goldberg, L. *Enlisted Supply: Past, Present, and Future*

Goldberg was able to test his model by forecasting high school graduate enlistments for fiscal 1981 and comparing his results to the actual number of enlistments for the same period. The model underestimated AFQT category I and II enlistments by 2.1 percent. It also underestimated AFQT categories I through IIIA enlistments by 3.6 percent. The model did overestimate total high school graduate enlistments by 1.4 percent.

A comparison of the forecasts of the enlisted supply by both Fernandez and Goldberg provides some interesting results. Table 11 on page 31 presents the accuracy of the Navy enlistment supply projections of AFQT category I and II recruits for fiscal 1981. Forecast error is computed using the fiscal 1981 actual Navy enlistment total of 29,100 recruits reported by Goldberg [Ref. 27: p. 53.].

The table shows that the accuracy of the enlistment supply estimated by Fernandez in the case "A" environment for a condition of low economic growth compares favorably with the accuracy obtained by Goldberg. The accuracy of the estimates made by Fernandez decreases as the rate of the economic growth moves higher. The accuracy for the case "B" model is very poor, exceeding 22 percent.

Table 11. ACCURACY OF NAVY ENLISTMENT SUPPLY PROJECTIONS OF AFQT CATEGORY I AND II RECRUITS FOR FISCAL 1981

Type of Forecast		Projected Supply	Forecast Error (%)
Fernandez Model Case "A"	High Growth	27,676	− 4.9
	Moderate Growth	28,075	− 3.5
	Low Growth	28,323	− 2.7
Fernandez Model Case "B"	High Growth	21,960	− 24.5
	Moderate Growth	22,250	− 23.5
	Low Growth	22,432	− 22.9
Goldberg Model		28,500	− 2.1

Sources: Goldberg and Fernandez

E. EDUCATIONAL EXPECTATIONS OF POTENTIAL RECRUITS

The demand for and the expectation of education by an individual can be thought of as an economic choice. If the individual perceives, if not explicitly, that the investment expenditures of direct expenses, forgone earnings, and psychic loss are less than the expected returns of a higher level of earning at some future point, greater job satisfaction over his or her lifetime, and a greater appreciation of nonmarket activities, then the individual is more likely to desire and pursue a higher level of education. Psychic loss in this context refers to a cost that is incurred because education is difficult and tedious.

The benefits derived from increased education must be calculated over time and require discounting to the present value. The present value (PV) may be expressed mathematically as [Ref. 28: p. 294]:

$$PV = \sum_{t=0}^{T} \frac{B_t}{(1+r)^t} \tag{3.1}$$

where:

PV is the present value of the benefit,

B is the value of the benefit at time t,

r is the discount rate.

The discount rate is a measure of how much the individual weighs future outcomes or events. If the individual does not weigh future benefits very heavily, he or she is considered present-oriented. The more present-oriented an individual is, the higher the discount rate (r) will be. [Ref. 28: p. 296]

The benefits are discounted over a period of time t which, in this case, is considered to be the length of the working life of an individual. Given a retirement age of 65 years, an 18- year-old high school graduate would be able to discount a college education over a greater length of time than a 25- year-old. Therefore, younger people are more inclined than older people to obtain a college education, other factors being equal [Ref. 28: pp. 297-298].

The decision to invest in a college education can be mathematically expressed as [Ref. 28 : pp. 295-296]:

$$\sum_{t=0}^{T} \frac{B_t}{(1+r)^t} \geq C \tag{3.2}$$

where:

C is the total cost, both direct and indirect, of a college education,

B_T is the yearly difference in earnings between a high school and college graduate.

The above model allows the following general assumptions to be made concerning the economic choice of a college education [Ref. 28: pp.295-296]:

- present-oriented individuals are less likely to attend college than forward looking individuals, other variables being held equal;
- college students will tend to be young;

- the demand for college education will increase if the costs to the student decrease; and
- the demand for college education will increase if the benefits of one increase.

Fredland and Little conducted a study to examine the differences between 18- to 22-year old servicemen and civilian males of the same cohort with respect to education levels, aspirations, and expectations [Ref. 29]. The data was obtained from the National Longitudinal Survey, Youth Cohort, 1979. The study was intended to serve the purposes of:

- providing insight into the quality of service members compared to their civilian counterparts, and
- assessing the utility of a postservice educational program as a recruiting attraction by using a measure of educational aspirations and expectations.

Fredland and Little found that the educational aspirations and expectations of persons in the military exceeded that of their civilian counterparts. A summary of their findings for the white subgroup, expressed as percentages, is provided in Table 12 on page 34.

Fredland and Little found that among blacks, 22 percent of the military aspired to obtain a graduate education, beyond four years of college education, compared with 21 percent of the civilian sample. Among Hispanics, 21 percent of those in the military expressed the desire to complete graduate education while only 18 percent of their civilian counterparts indicated the same. Among whites, 47 percent of military respondents aspire to complete a four-year college education while only 36 percent of the respondents expect that they will complete it. This contrasts to 27 percent of the white civilian respondents who aspire to a college education while 23 percent of the respondents expect they will complete it. It appears that, while more white military respondents aspire to college education, a greater proportion of their civilian counterparts expect to fulfill their aspirations.

Table 12. EDUCATIONAL ASPIRATIONS AND EXPECTATIONS OF 18- TO 22- YEAR-OLD WHITE MEN

Level of Education	Percentage of Respondents	
	Military	Civilian
Graduate Education:		
Aspire	11	17
Expect	18	23
College Education:		
Aspire	47	27
Expect	36	23
High School:		
Aspire	21	35
Expect	29	35

Source: Fredland, J.E. and Little, R.D. *Educational Levels, Aspirations, and Expectations of Males, Ages 18-22*

Fredland and Little offered the following conclusions:

- Whites, Blacks, and Hispanics in the military desire, on average, significantly more years of college education than their civilian counterparts.
- Military members expect to complete more years of education than their civilian counterparts.
- Educational aspirations and expectations may serve as indicators of quality.
- The services appeared to attract many who desired and expected further education without the benefit of postservice educational benefits.

Hosek, Peterson, and Eden examined the probability of an individual enlisting as a function of personal characteristics, family background, employment situation, and educational expectations. The study was undertaken because it was felt that the military would be faced with increased competition for youth labor due to the shrinking labor pool and a consequent rising civilian wage. The study was intended to assist the Services in defining segments of the recruiting markets and then design tactics to target those segments. [Ref. 30: p. v.]

The study by Hosek et al. was distinctive in three ways. First, they analyzed actual enlistment behavior as opposed to enlistment intentions. Second, the behavior of individuals was analyzed and not that of aggregated data. Finally, enlistment behavior was

analyzed in distinct segments of the recruiting market because of a large, specially created data base. The recruiting market segments upon which they focused were high school seniors and high school graduates who were not students.

The findings of the study indicate that graduates are more sensitive to work-related variables than are high school seniors when determining propensity to enlist. The work-related variable included wage rate, job tenure, labor force experience, weekly hours worked, and employment status. Seniors were more responsive to educational variables such as learning proficiency, ability to finance education, and parental influence. The study found that the longer a graduate enjoys success in the civilian labor market, the less likely he is to enlist.

Shavelson, Haggstrom, and Winkler attempted to determine the recruiting potential of the two year college market. They examined the educational expectations of high school seniors. They found that seniors who anticipated attending a two-year college expected to obtain one more year of education than seniors who planned to enter the military. Additionally, seniors expected one more year of education than what was available from a two-year degree program [Ref. 31: p. 65]. The two-year college-bound senior was more than twice as likely to aspire to a professional career than the senior who planned on entering the military.

The researchers concluded that enlistment packages should address the educational expectations and professional aspirations of the two-year college student. The inclusion of an educational benefit package may address those needs.

Shavelson et al. estimates that the postsecondary education market contains over one million men. These men meet or exceed enlistment standards and fall within recruitment age ranges. The authors suggest that by recruiting from this market, enlistment quality may increase because of the influx of high school graduates with above average aptitudes [Ref. 31: p. 73].

F. THE EFFECTS OF EDUCATIONAL BENEFITS ON ENLISTMENTS

An early study attempting to relate enlistment behavior to educational benefits was conducted by Arima in 1978. This study sought to determine the incentive value of the Navy Campus for Achievement (NCFA) in attracting volunteers for enlistments. To do this, a recruiting aids booklet that described the NCFA was developed and made available to recruiters. Advertising devoted exclusively to the NCFA was also developed and distributed through two national weekly magazines [Ref. 32: p. ii].

The effectiveness of the recruiter's booklet was measured by the number of issues ordered by the recruiter. Arima compared the monthly demand for the booklet with the number of contracts signed per month, which he estimated at 10,000. This yielded a ratio of approximately four to five booklets distributed for each contract. According to Arima, this was an indication of its value as a "sale" tool. [Ref. 32: p. 19]

The effectiveness of media advertising was measured by the number of inquiries and eligible leads that were received at the Navy Opportunities Center. The NCFA ad drew nearly 20 percent more total inquiries than the average of the leads generated for the other four concurrent enlistment programs [Ref. 32: p. 21].

Based on the demand for the NCFA booklet and the response to media advertising, Arima states that the "concept of the NCFA has very great incentive value for the recruiting effort of the Navy" [Ref. 32: p. 23]. Arima concluded the study by recommending that the NCFA should emphasize the college education opportunities available in the Navy, as well as the opportunities for learning technical skills [Ref. 32: pp. 26-27].

An extensive study was conducted by the Rand Corporation from December 1980 to September 1981 to determine the enlistment effects of four different educational benefit programs. There were several policy issues that had to be considered in the test. These issues were [Ref. 33 : pp. 2-3]:

- Would the educational benefits attract high quality recruits?
- Should the educational benefits be available to all enlistees or be targeted toward particular subgroups, such as enlistees in hard to fill or critical occupational skills?
- What are the effects of special features, such as education loan repayment?
- Would the educational benefits have an adverse effect on retention?

The programs were offered in balanced sets of geographic areas nationwide. In addition to a control program, three new educational benefit plans were designed by DoD and Congress. The plans were [Ref. 33: pp. 5-6]:

- Control: this plan provided the Basic VEAP in which all personnel from each of the Services was eligible to participate. Additionally, the Army offered up to a $6,000 enlistment bonus to high quality personnel in critical skill occupations.
- Ultra-VEAP: this plan provided the Basic VEAP with a kicker of $8,000 for a two-year enlistment or $12,000 for a three- or four-year enlistment in the Army. The other Services offered just the Basic VEAP.
- Noncontributory VEAP: this plan provided the Basic VEAP plus up to $6,000 kicker for qualified Army enlistees without requiring payments from the individuals.

- Tuition/Stipend: this plan provided a more generous noncontributory plan offering up to $15,600 in benefits and indexed for inflation. This plan was universally offered by all the Services and did not include kickers.

Table 13 compares the four programs by service and by percentage of geographic availability nationwide. Amounts are in dollars and are net of the individual's contribution. The table shows that the control program was offered in more than half the nation. The Ultra-VEAP program, which had the greatest dollar benefit value to an Army recruit, was offered in 18 percent of the nation. The Tuition/Stipend program which offered the greatest dollar benefit value to recruits of the other Services, was offered in only 15 percent of the nation.

Table 13. MAXIMUM DOLLAR BENEFIT VALUE OF EACH OF THE TEST PROGRAMS AND THEIR DISTRIBUTION NATIONWIDE

Benefit Plan	Maximum Value to an Army Recruit	Maximum Value to a Recruit of the Other Services	National Distribution
Control	11,400	5,400	52 %
Ultra-VEAP	17,400	5,400	18 %
Noncontributory VEAP	14,100	8,100	15 %
Tuition Stipend	15,600	15,600	15 %

Source: Fernandez, R.L. *Enlistment Effects and Policy Implications of the Educational Test Program*

The Basic VEAP was open to all enlistees. However, to be eligible for kickers and the noncontributory test plans, enlistees had to meet certain eligibility requirements. For example, recruits had to possess a high school diploma and score in the upper 50th percentile of the AFQT. Additionally, the recruit had to enter one of a number of critical occupational skills as determined by the service [Ref. 33: p. 11].

The results of the test indicated that the noncontributory plans had a positive effect on enlistments in the Air Force and Navy. When compared to the control program, the noncontributory VEAP increased enlistments by 3.6 percent in the Air Force and 3.4 percent in the Navy; however, neither result was statistically significant. On the other hand, the Tuition/Stipend program was statistically significant and increased enlistments by 5.6 percent in the Air Force and 8.2 percent in the Navy [Ref. 33: pp. 14-16].

The impact of the tests on Army enlistments was even more impressive. The Ultra-VEAP program increased enlistments by 8.7 percent when compared to enlistments generated by the control program and the increase was statistically significant. The noncontributory VEAP performed essentially the same as the control plan and had a negligible effect on enlistments [Ref. 33: p.17].

The Tuition/Stipend plan apparently reduced Army enlistments by approximately 6 percent when compared with the control plan [Ref. 33: p. 18]. The explanation for this decrease may lie in the differences of the net maximum benefit value of the four programs. In all the programs except one, the Army enjoyed a benefit value advantage of at least 43 percent. In the Tuition/Stipend plan, the benefit value is equal among all the Services. The authors concluded that if the Army were not able to offer greater benefits than the other Services, then high-quality enlistments would be reduced [Ref. 33: p. 19].

The study also concluded that educational benefit plans were successful in channeling recruits into those occupational groups which had been targeted. However, the results suggested that if program eligibility were to be opened to enlistees in other than critical occupational ratings, then enlistments into the critical ratings would decrease [Ref. 33: p. 33].

A second Rand study of this test affirmed the findings of the earlier research. Fernandez found that Army enlistments could be reduced if a benefit differential was not maintained. He also found that educational benefits may be less effective in attracting recruits into the Army than into the other Services. Fernandez also affirmed the skill channeling effects in the Army. He concluded that enlistments in eligible specialties under the Ultra-Veap rose sufficiently to absorb all of the total enlistment gain attributable to the program. [Ref. 34]

Lockman also indicated the importance of educational benefit programs to increased enlistment levels. In an effort to explain the underlying reasons for the Army's success in recruiting high quality enlistees, he identified the following [Ref. 35]:

- the Army College Fund: Ultra-VEAP kickers of up to a maximum of $12,000 plus an enlistment bonus maximum of $8,000;
- Labor Department Employment and Training Administration program budget cuts; and
- an increase of 13 percent in the number of Army recruiters in two years.

G. OTHER DETERMINANTS OF ENLISTMENTS

The need for developing a more accurate means of estimating enlistment supply has increased with time. According to Morey and Mc Cann, this need becomes particularly

important in light of a shrinking population base and an expanding economy. The importance of accurate supply estimation is emphasized to an even greater degree when one considers the impact that an annual recruiting budget of $1 billion or more can have on DoD manpower costs. Morey and Mc Cann also maintain that enlistment supply estimation not only affects manpower budgets but also weapons system design and authorized manning levels. [Ref. 36]

The authors reviewed twenty studies that were conducted between 1975 and 1980. The studies used the all-volunteer experience as the basis for their findings, which are often divergent. The authors were able to distill thirteen factors which they considered to be important to the estimation of enlistment supply.

The authors state that the preferred dependent variable is enlistment contracts as opposed to accessions and the ideal dependent variable is high-quality contracts. Accessions are not the preferred dependent variable because the time-sensitive variables, such as unemployment, advertising, pay, etc., have less of an affect unless they are sufficiently lagged. The important explanatory variables identified by Morey and Mc Cann are:

- unemployment rate;
- number of production recruiters;
- advertising;
- demographics;
- seasonality;
- special events;
- quotas and standards;
- demand limitations;
- interservice competition;
- Delayed Entry Program;
- military compensation;
- federal and state minimum wages; and
- length of first term contracts.

The independent variables of military pay, unemployment, and recruiters were found to have a significant effect on total enlistment supply in a study done by Goldberg and Greenston [Ref. 37]. The authors found that the loss of the G.I. Bill in 1977 caused a

large reduction in overall enlistments. Goldberg and Greenston also found that the percentage of an area's black population was negatively correlated with enlistments.

Dale and Gilroy analyzed primarily macroeconomic factors of enlistment in a 1984 study [Ref. 38]. The purpose of the research was to specify a more robust model of Army enlistments as a function of pay, unemployment, and other exogenous variables such as educational benefits and advertising expenditures. Using time series data, the model utilized the current teenage unemployment rate as well as the unemployment rate lagged for two and four months.

The authors arrived at the following conclusions as a result of the study:

- a rise in the unemployment rate led to a substantial increase in Army enlistments;
- a military wage freeze resulting in an increase in the military-to-civilian wage ratio would cause a substantial decrease in the enlistment rate;
- educational benefits are important to high school graduate enlistees; and
- noneconomic factors such as recruiter-to-population ratio have a significant impact on enlistments.

H. ADVERTISING AND THE MILITARY MARKET

According to Martin [Ref. 39], the change to all-volunteer recruiting was a move from draft dependence to market dependence. This caused DoD to assume a role of a marketer to the youth of the nation. This change also made the military an instrument in a large scale test of the application of marketing theory and practice to a national public policy issue.

Martin contends that recruiting advertisement is the most criticized and least understood aspect of military manpower procurement. This is because it is very difficult to establish quantitatively the impact that advertising has on recruitment. This frustration is worsened when the impact of advertising must be measured in terms of geography (national, regional, and local audiences); media (television, radio, periodicals, newspapers, and direct mailings); or targeted audiences (black, Hispanic, or college bound).

Martin presents several issues that might be encountered by the Navy (or any government marketer) when applying marketing theory and practice to recruiting:

- Marketing, or "selling," may be perceived negatively by the public. The government has a special responsibility to ensure that marketing approaches are above reproach.
- Programming and budgeting are very difficult aspects of advertising. The question "How much is enough?" is hard to answer confidently.

- The taxpayer deserves the same quality marketing management as do the shareholders of any major private sector firm.
- Product changes are difficult to accomplish for government marketers, especially given governmental managerial processes.
- Government marketers have difficulty adapting to a dynamic market.
- The feasibility of a marketing theory and practice approach for recruiting sufficient numbers of youth, particularly in light of a shrinking population base, may be questionable.

Goldberg [Ref. 40] conducted a study to analyze the effects that recruiters and advertising have on the enlistment of high school graduates in the Navy. In response to recruiting shortfalls during fiscal years 1978 and 1979, several options were being considered to raise the number of high-quality recruits. Goldberg hypothesized that increasing the resources allocated to recruiters and advertising may be a less expensive means of generating enlistments than raising pay or pay bonuses.

It is difficult to measure the effect of advertising on enlistments. Goldberg states that advertising increases the demand for a product at the time of the expenditure and in the future. However, the effect of advertising also decays over time. Therefore, the impact of advertising must be thought of in its immediate and cumulative effect components as well as with an estimate of its rate of decay or depreciation rate.

Goldberg treats Navy advertising as an investment in a stock of "awareness capital." He assumes that a current expenditure of $250 generates one unit of awareness capital in the following quarter. The net capital stock depends on the base period stock of awareness capital (K_0), the depreciation rate per quarter (δ), and the stream of advertising investments (I_t). The net capital stock in any period t, except the base period, can be expressed as:

$$K_t = K_0 X_t(\delta) + Y_t(\delta) \tag{3.3}$$

where:

$$X_t(\delta) = (1 - \delta)^t \tag{3.4}$$

$$Y_t(\delta) = \sum_{t=0}^{T} I_t(1 - \delta)^{t-1} \tag{3.5}$$

Goldberg estimated high school graduate enlistments using maximum likelihood estimation since he did not know the depreciation rate per quarter. He included both

$X_t(\delta)$ and $Y_t(\delta)$ as explanatory variables, along with other factors when modeling high school graduate enlistments. The regression coefficient of $Y_t(\delta)$ is the measurement of the effect that a one unit of change in awareness capital stock has on enlistments. The regression coefficient of $X_t(\delta)$ is equal to the product of K_0 and the coefficient of $Y_t(\delta)$.

Goldberg tested his model using 1978 data and the model predicted sharp declines in enlistments with a 2.1 percent error for the year. The effect of an advertising budget increase of $1 million was an increase of 1,206 high school graduate enlistments. Of this amount, only 37 percent would be in AFQT categories I through IIIA. Therefore, Goldberg concluded that most advertising effects are realized by recruits in the lower AFQT categories. Additionally, based on an estimated depreciation rate of 11 percent per quarter, the effects of advertising were felt mostly in the future.

Hanssens and Levien [Ref 41] conducted a study that attempted to investigate the effectiveness of aggressive marketing strategies undertaken by the Navy to attract a sufficient number of qualified enlistments. The emphasis of their study was on the effects of advertising and personal selling.

The Navy's marketing efforts consisted of recruiters, recruiting aids, and media advertising expenditures. The advertising expenditures consisted of television, radio, direct mail, outdoor media (billboards, buses, etc.,), and magazines/newspapers. All of the efforts were expected to positively influence enlistments with the possible exception of local advertising. The research also examined the effect of market-specific phenomena such as advertising wearout, word-of-mouth, and components of personal selling effort.

The authors identified a unique characteristic of the recruiting market. They observed that the product, enlistment, can be purchased only once; therefore, the market is subject to continuous depletion and rejuvenation. Youth cohorts enter the market at age 17 and exit the market either by enlisting or aging. Market depletion is important, according to Hanssens and Levien, because it relates to the concept of advertising wearout. As an advertising campaign is initiated, the response in the form of enlistments is immediate, but levels off over time. Two reasons are offered for this. First, given that some youths are more likely to enlist than others, individuals then respond to advertising by enlisting, and the size of the target market shrinks. The second reason is that the remaining prospects are less likely to enlist and that continued advertising will have little effect on this group.

The authors expected advertising wearout to occur in the television, radio, printed, and outdoor media. Wearout may occur but is not measurable. The authors do not

expect wearout in direct mail advertising because of the selective exposure of this category.

The second market phenomena investigated by the study is that of word-of-mouth. The authors make the assumption that in the youth market, where the new recruits are highly interactive with potential recruits, it is reasonable to expect that recent enlistees may influence their peers to enlist. This effect is measured by the monthly per-capita size of the Delayed Entry Program (or DEP) pool.

The third phenomena is that of personal selling. The authors attempt to measure this effort based on the number of recruiters and monthly accession goals. The monthly accession goals are hypothesized to provide a measure of the motivation of the recruiter. The effort of personal selling is also measured by the expenditures on recruiting aids.

The authors used a log-linear multivariate base model because of its reported advantage in sales response research. The measures of recruiting performance that were estimated are:

- enlistment leads;
- DEP contracts; and
- direct ship contracts.

The results with respect to advertising indicated that national enlistment leads are significant only for the DEP contracts and have an elasticity of about 0.11. This may be an indication that most contracts were the result of a locally generated lead.

The enlistment lead equation had elasticities of 0.44 for mass media advertising and 0.11 for direct mail. Local advertising had an elasticity of – 0.06 and word-of-mouth had an elasticity of 0.18. The word-of-mouth elasticity may indicated that a positive influence was exerted by DEP recruits on potential enlistees.

The percentage of high school seniors in the target population had an elasticity of 0.90 in the direct shipment contracts equation. The motivational factor of accession goals had an elasticity of about 0.65; and the elasticity for recruiters was 0.24.

The authors concluded that advertising has most of its effect in generating leads rather than contracts. In other words, advertising is more effective in generating interest rather than making a sale.

I. SUMMARY

In summary, the purpose of this review has been to examine the factors that influence the decision of a young man or woman to enlist in the military. The decision is

influenced by economic, demographic, and societal concerns. The development and application of an educational benefits program should be able to influence each area of concern.

The educational benefits program that is offered to potential enlistees should be designed to attract high-quality recruits to ensure that a supply of requisite quality and numbers is available to the Navy. The prospective recruit must perceive the program as having a positive economic benefit greater than his or her other alternatives. The program should be targeted towards groups that have indicated a desire for education beyond the secondary level. Finally, since the program is targeted to a select audience, the program should be marketed in the most cost-effective manner.

IV. DATA BASE, METHODOLOGY, AND FINDINGS OF THE FREQUENCY ANALYSIS

A. GENERAL

Navy Recruiting Command provided two data bases that were used in this research: PRIDE and the Enlistment Market Analysis. The PRIDE data base is the Personalized Recruiting for Immediate and Delayed Enlistment System. This was used to make frequency comparisons between enlistment programs and is discussed in greater detail below.

PRIDE provides the Navy with an orderly and efficient mechanism for management and control of the recruiting process [Ref. 42: pp. 1.1-1.2]. The Pride System performs the following functions:

- evaluates the qualifications of each accession against the qualifications required by each enlistment program. This prevents the individual from enlisting into a program for which he or she may not be qualified for;
- assigns new accessions to "A" school training quotas, thus allocating training resources; and
- identifies the occupational ratings for which the individual is best suited.

B. CHAPTER ORGANIZATION

This chapter describes the construction of the sample data file, the determinants used in selecting comparisons, the construction and modification of variables, the methodology employed and the findings of the frequency analysis.

C. DATA FILE CONSTRUCTION

The sample data file was constructed by obtaining a random sample of the PRIDE data base. The PRIDE data base contained 430,825 records of individual accessions into the Navy from fiscal 1983 to fiscal 1989 (except for fiscal 1985 for which there were no records available). The data base was sorted by date of enlistment, and then a sample of 30,000 records was selected randomly using direct access sampling with replacement. This sample was used in all steps of the analysis.

The sample provided individual information on the accessions. This information included, but was not limited, to:

- AFQT percentile scores,
- ASVAB subtest scores,

- Enlistment programs,
- Date of Enlistment and Ship date,
- Birth date,
- Gender,
- Level of education,
- Race and Ethnic background, and
- Enlisted rate.

Records were removed from the data base that would be of limited interest or that would be a potential source of errors. The criteria used and justification were:

- if the individual's AFQT percentile score was recorded as being less then ten, then the record was deleted. An AFQT percentile score of less than ten places the individual in AFQT category V, (ineligible for enlistment).
- if the individual's AFQT percentile score was recorded as being greater than 99, then the record was deleted. A percentile score of 100 was of little value and was considered to be a coding error.
- if the individual was a woman, then the record was dropped from consideration. This is because of the comparatively low proportion (2.4 percent) of women permitted to enlist under the SCP [Ref. 11].
- if the individual had a birth date prior to 1 January 1961, then the record was deleted. Individuals born before this date would have been too old to enlist under the SCP when it was implemented. This step also removed those records where the birthdate may have been improperly coded.
- only those records that had a recorded enlistment date of between 1 October 1982 (the start of fiscal 1983) and 30 September 1989 (the end of fiscal 1989) were analyzed.

This procedure reduced the size of the sample database by 25.6 percent. The final number of observations in the sample was 22,309, or 5.18 percent of the original data base. See Table 14 on page 47 for the number of observations that were deleted for each criterion used.

Table 14. NUMBER OF OBSERVATIONS (N) DELETED FOR EACH CRITERION USED

Criterion Used	Number of Observations (N) Deleted
Less AFQT Category V	2,733
Less AFQT Percentile Score Greater Than 99	1
Less Females	3,070
Less Individuals Born Prior to 1 January 1961	1,134
Less Enlistments Prior to 1 October 1982	0
Less Enlistments After 30 September 1989	753

D. VARIABLE CONSTRUCTION AND MODIFICATION

The variable RACE was condensed from six categories to three. The three categories are:

- White: all recruits who were coded as being caucasian;
- Black: all recruits who were coded as being black;
- Other: all recruits who were coded as being Asian, American Indian, other or unknown.

There were three variables created for the analysis. These variables were ETHNIC, AFQTMG, and DODOCC. Details of their construction are presented below.

1. ETHNIC

The original data base used 22 codes to describe the ethnicity of accessions. This number of ethnic groups was not practical for analysis because of the small cell frequencies of some of the groups. Greater than 89 percent of the accessions had their ethnic background described as "other," "unknown," or "none," with the remainder distributed over the other groups. Therefore, the ethnic group was collapsed into eight categories, shown below:

- Asian: included all who had been coded as being Chinese, Japanese, Korean, or Vietnamese;
- Asian-American;
- Filipino;

- Hispanic: included all accessions who had been coded as being of Spanish descent, Puerto Rican, Mexican-American, Cuban-American, or Latin American (Hispanic);
- Indian;
- Island: included all who had been coded as being Melanesian, Micronesian, Polynesian, or of other Pacific Island heritage;
- Native American: included American Indian, Aleut, and Eskimo; and
- Other: category included all accessions who had not been coded as being part of any other category.

2. AFQTMG

The AFQT percentile scores were divided into AFQT categories I through IV. This permitted analysis of an enlistment program by AFQT category. The cutoff used in assigning an accession to an AFQT category is provided in Table 15.

Table 15. ASSIGNMENT OF AFQT CATEGORY BY AFQT PERCENTILE SCORE

If AFQT Percentile Score was	Then AFQT Category was
93 or greater	I
From 65 To 92	II
From 50 To 64	IIIA
From 31 To 49	IIIB
From 10 To 30	IV

Source: Cooper, R.V.L. *Military Manpower and the All-Volunteer Force*

3. DODOCC

This variable is the DoD occupational code and it is a discrete variable ranging from zero to nine. This code converts all Navy ratings to a DoD occupational standard. Table 16 on page 49 provides the discrete DODOCC occupational code and its title. DoD Occupational Area Code nine consists of service memberswho are medical facility patients, prisoners, officer candidates, etc., and are not considered in the frequency analysis. Appendix A provides the DoD occupational code and the Navy ratings that comprise that code.

One alteration has been made. The DoD occupational conversion manual requires that the Fireman (FN) rating be included as part of the DoD occupational group one, Electronic Equipment Repairers. When the other Navy ratings which also comprise

this group are surveyed, it can be seen that there is a dissimilarity between them and the GENDET rating of FN. The dissimilarity is that rarely do FNs advance into ratings such as Data System Technicians (DS), Fire Controlman (FC), or Missile Technician (MT). Therefore, FNs were categorized with the Boiler Technician (BT), Electrician's Mate (EM), Machinist's Mate (MM) and the other engineering ratings in DoD occupation code six [Ref. 43].

Table 16. DOD OCCUPATIONAL CODES AND TITLES

DoD Occupational Code	Title
0	Infantry, Gun Crew, and Seamanship Specialists
1	Electronic Equipment Repairers
2	Communication and Intelligence Specialists
3	Health Care Specialists
4	Other Technical and Allied Specialists
5	Functional Support and Administration
6	Electrical Mechanical Equipment Repairers
7	Craftsmen
8	Service and Supply Handlers
9	Non-Occupational

Source: DoD *Occupational Conversion Manual: Enlisted/Officer/Civilian*

E. METHODOLOGY

The data base was analyzed across three distinct time periods; prior to SCP availability, during SCP availability, and following SCP availability. For the sake of brevity and clarity, these periods will are numbered as periods I, II, and III, respectively. The dates that formed the demarcation of the periods were 1 April 1986, when accessions were allowed to enlist into the DEP under the SCP, and 4 December 1987, when no new contracts for enlistment under the SCP were to have been written.

For each time period, the number of accessions in each enlistment program was determined by AFQT category. The number of recruits who enlisted as Airman (AN), Fireman (FN), or Seaman (SN) were also determined by AFQT category. In a like manner, the number of recruits by each occupational group were determined by AFQT category.

The number of recruits in the enlistment programs, GENDET ratings, and DoD occupational group was also evaluated by race, ethnic background, and age. The number of recruits was not evaluated by level of high school education because of the high percentage of actual and probable high school diploma graduates. An accession categorized as a probable high school diploma graduate is one who will reasonably be expected to earn a diploma while in the DEP. no wonder !

Overall, the rate for actual and probable diploma graduates in all enlistment programs was 89.92 percent. The highest rate (100 percent) occurred in the SCP and the Nuclear Field programs. The lowest high school graduate rates occurred in the TAR Enlistment Program (84.52 percent) and the Five-Year Obligation Program (85.80 percent).

The primary purpose of this frequency analysis was to determine if a change occurred in the number of enlistments in any program, GENDET rating, or occupational code during the three periods. A secondary purpose was to see if the racial, ethnic, or age mix of the recruits changed over the same periods.

The significance of such a change may give some indication of a market expansion effect of the SCP. It is possible that a recruit who may have initially been interested in the SCP eventually enlisted under some other program. This could be the result of finding out that he was not qualified for participation in the SCP or that some other program held greater appeal than the SCP.

The changes in the recruitment levels of programs could have taken one of four forms. The program could have experienced declining levels across the time periods. Conversely, the program could have experienced increasing levels of enlistment across the time periods. The programs could have had an increase in accessions from period I to period II, followed by a decline in period III. Finally, the program could have had a decreasing level of enlistment from period I to period II, and then increased in period III.

The consistent decreasing or increasing level of enlistment is not the focus of this research. It is hypothesized that whatever the factors that caused the change would only be marginally affected by the SCP. That is, the SCP would only serve to accelerate or decelerate the change, but have little impact on the overall direction.

Of more interest were those programs that had experienced a reversal of enlistment levels (e.g., an increase followed by a decrease, or vice versa). Not all of this change can be attributed to the availability of the SCP. There were three other enlistment programs that were introduced during the time period under consideration. These programs were

the DIVERS, JOBS (Job Oriented Basic Skills), and PSI (Programmed School Input). These three programs account for a total of 344 enlistees in the sample.

The records of recruits in DIVERS, JOBS, and PSI programs were deleted from the analysis if it appeared that they would influence the study. This condition existed when analyzing the frequencies of individual programs and GENDET ratings by AFQT categories. The enlistment programs are mutually exclusive of the three other programs. However, when the variables RACE, ETHNIC, and DODOCC were analyzed, or when analyzing the means of the AFQT percentile scores or SCREEN scores, the accessions under the three new programs were deleted.

In a similar fashion, the means of the AFQT percentile scores and the SCREEN scores were also analyzed across the time periods because they provide an indication of the level of quality. A SCREEN score is the probability that a recruit will complete his or her first year of enlisted service [Ref. 44: p. 1]. SCREEN is based on grade of education, whether or not the applicant has dependents, AFQT score, and the applicant's age. An enlistee who scores higher on SCREEN has a greater probability of completing his or her first year of enlistment. Therefore, enlistees with higher scores are more desired by the Navy than those with lower scores, other factors being equal.

A significant change in the mean AFQT score or SCREEN score would indicate a change in the level of quality within the program being analyzed. The changes of interest are the same in evaluating the means as they were in evaluating the frequencies. The changes that were closely examined were those that declined from period I to period II and then increased in period III, or vice versa. As in the frequency analysis, the records of accessions who enlisted under the DIVERS, JOBS, and PSI programs were deleted from the analysis.

All analysis was done using the SAS software system for data analysis. A Chi-square χ^2 test for independence between the two variables under consideration was conducted for all frequency analysis. The null hypothesis is that of no association, or that there is independence between the row variable and the column variable [Ref. 45: pp. 403-432].

The second statistical test used was for comparing the means of the AFQT percentile scores and SCREEN scores for each period of the analysis. The t statistic and the associated degrees of freedom (df) statistic were computed as follows [Ref. 45: p. 797]:

$$\hat{t} = \frac{|\overline{X}_i - \overline{X}_j|}{\sqrt{\frac{s_i^2}{n_i} + \frac{s_j^2}{n_j}}} \tag{4.1}$$

$$df = \frac{\left[\left(\frac{s_i^2}{n_i} + \frac{s_j^2}{n_j}\right)\right]^2}{\frac{\left(\frac{s_i^2}{n_i}\right)^2}{n_i - 1} + \frac{\left(\frac{s_j^2}{n_j}\right)^2}{n_j - 1}} \tag{4.2}$$

where:

$\overline{X}_i$ is the mean of sample i;

$\overline{X}_j$ is the mean of sample j;

s_i^2 is the variance of sample i;

s_j^2 is the variance of sample j;

n_i is the number of observations in sample i;

n_j is the number of observations in sample j;

$\hat{t}$ is the computed t statistic;

df is the number of degrees of freedom.

The null and alternate hypotheses are:

$$H_0: \overline{X}_i - \overline{X}_j = 0$$

$$H_a: \overline{X}_i - \overline{X}_j \neq 0$$

if $\hat{t} \leq t$ then the null hypothesis is accepted; otherwise the null hypothesis is rejected.

F. FREQUENCY ANALYSIS FINDINGS

The GENDET ratings, enlistment programs, and DoD occupational area code categories were analyzed by AFQTMG, RACE, ETHNIC, mean AFQT score, and mean SCREEN score. Only the findings for the GENDET ratings are presented in this chapter, since the SCP was specifically targeted at these ratings. The results for individual enlistment programs and DoD occupational area code categories are provided in Appendices B through G.

Table 17 on page 53 through Table 28 on page 59 provide the enlistment level changes of the AN, FN, and SN ratings by AFQT categories and Race/Ethnicity for the

three time periods under analysis. These tables also provide the changes in the ratings by mean AFQT percentile score and mean SCREEN score. Each table of rating enlistment levels by AFQT category includes the Chi-square test statistic (χ^2), which measures the independence of the two variables [Ref. 45: pp. 412-413].

The null hypothesis of the Chi-square test is that the two variables are independent. The null hypothesis is accepted when the χ^2 test indicates that the probability that the two variables are independent is greater than a significance level of 0.01. There was not enough statistical evidence to accept the null hypothesis of independence between GENDET ratings and AFQT category. The Pearson's contingency coefficient (CC) is provided and is a measure of the strength of the relationship between the two variables [Ref. 46: p. 482].

1. Airman (AN) Rating

Table 17 shows the changes in enlistment level in the AN rating by AFQT category over the time periods. AFQT category I experienced the most change with an increase of 15 recruits from the first to the second period, followed by a 25 percent decrease. AFQT category II had an increase of 134 recruits from period I to period II.

Table 17. ENLISTMENTS INTO THE AIRMAN (AN) RATING BY AFQT CATEGORY

AFQT Category	Period I	Period II	Period III
I	1	16	12
II	45	179	177
IIIA	81	148	171
IIIB	142	295	408
IV	76	138	207
Total Number of Enlistments	345	776	975
χ^2	28	55	65
CC	0.019	0.069	0.092

Table 18 on page 54 shows the number of new recruits into the AN rating by racial and ethnic groups. The enlistment levels into this rating increased through the three periods for whites, blacks, and Hispanics.

Table 18. ENLISTMENTS BY RACIAL/ETHNIC GROUP INTO THE AIRMAN (AN) RATING

Racial Ethnic Group	Period I	Period II	Period III
White	257	579	712
Black	72	163	220
Hispanic	33	77	90

The quality of Airmen recruits changed significantly over the time period of the analysis when the mean AFQT percentile score is used as a measure of quality. Table 19 shows that quality increased significantly between the time period before the SCP was offered (period I) and the time period in which it was implemented (period II). There is a significant decrease in the mean AFQT score in the period following the one in which the SCP was offered. However, the change is not statistically significant between periods I and III.

Table 19. MEAN AFQT PERCENTILE SCORES FOR AIRMAN (AN) ACCESSIONS

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	44.959	49.571	46.717
Standard Deviation	16.341	19.575	18.342
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	4.096	3.116	1.661
df	782	1611	672
Level of Significance	< 0.01	< 0.01	> 0.10

Table 20 on page 55 indicates that the quality of AN recruits, as measured by the SCREEN score, significantly increased in period II. This increase was also significant when comparing the mean of period I to that of period III.

Table 20. MEAN SCREEN SCORES FOR AIRMEN (AN) ACCESSIONS

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	82.719	84.196	83.756
Standard Deviation	9.071	5.034	6.052
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	2.837	1.660	1.974
df	441	1746	457
Level of Significance	< 0.01	> 0.10	< 0.05

2. Fireman (FN) rating

Table 21 shows that the enlistment levels for the FN rating had more pronounced changes in AFQT categories I and II than for category IIIA. Additionally, the changes in category IIIB, which was not a targeted AFQT category of the SCP, appear to be more distinct than the changes for Category IIIA.

Table 21. ENLISTMENTS INTO THE FIREMAN (FN) RATING BY AFQT CATEGORY

AFQT Category	Period I	Period II	Period III
I	0	5	2
II	27	77	49
IIIA	68	73	62
IIIB	124	203	177
IV	102	153	169
Total Number of Enlistments	321	511	459
χ^2	28	55	65
CC	0.019	0.069	0.092

Table 22 on page 56 indicates that there were possibly strong influences in attracting persons into the FN rating. This appears to be the case particularly for blacks, whose enlistment level more than tripled from period I to period II and then declined

by about 22 percent in period III. The decrease for whites and Hispanics in this same period was about 11 and 16 percent, respectively.

Table 22. ENLISTMENTS BY RACIAL/ETHNIC GROUP INTO THE FIREMAN (FN) RATING

Racial/Ethnic Group	Period I	Period II	Period III
White	267	349	309
Black	39	146	114
Hispanic	22	51	43

The changes in the mean AFQT percentile scores for FN recruits are not as significant as they were in the AN rating (see Table 19 on page 54). Table 23 indicates a significant decrease in the level of recruit quality from period II to period III. The difference in quality when comparing period I to period III was insignificant.

Table 23. MEAN AFQT PERCENTILE SCORES FOR FIREMAN (FN) ACCESSIONS

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	41.480	43.074	40.296
Standard Deviation	14.760	17.552	15.873
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.409	2.589	1.068
df	763	968	718
Level of Significance	> 0.10	< 0.01	> 0.10

Table 24 on page 57 shows that there was no significant change in the SCREEN scores of FN recruits over the time period of the analysis.

Table 24. MEAN SCREEN SCORES FOR FIREMAN (FN) ACCESSIONS

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	81.670	82.687	82.285
Standard Deviation	11.181	7.975	7.021
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.419	0.834	0.873
df	524	968	494
Level of Significance	> 0.10	> 0.10	> 0.10

3. Seaman (SN) Rating

Table 25 indicates that the enlistment of AFQT category I and II recruits into the SN rating nearly doubled from period I to period II. Enlistments of category IIIA recruits decreased slightly in period II; however, they increased by about 40 percent in period III.

Table 25. ENLISTMENTS INTO THE SEAMAN (SN) RATING BY AFQT CATEGORY

AFQT Category	Period I	Period II	Period III
I	10	21	22
II	130	228	220
IIIA	144	133	188
IIIB	322	352	579
IV	261	298	500
Total Number of Enlistments	867	1032	1509
χ^2	28	55	65
CC	0.019	0.069	0.092

The enlistment of whites, blacks, and Hispanics into the SN rating increased throughout the time of the analysis. There were no reversing trends evident by race or ethnic group from one period to another, as shown in Table 26 on page 58.

Table 26. ENLISTMENTS BY RACIAL/ETHNIC GROUP INTO THE SEAMAN (SN) RATING

Racial Ethnic Group	Period I	Period II	Period III
White	598	619	868
Black	227	365	566
Hispanic	66	93	150

Table 27 shows that there was a significant increase in the mean AFQT scores of SN recruits from period I to period II. It is also evident that there was a significant decrease in the level of recruit quality from period II to period III. The recruit mean AFQT score in period I is not significantly different from that in period III.

Table 27. MEAN AFQT PERCENTILE SCORES FOR SEAMAN (SN) ACCESSIONS

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	44.002	46.721	43.041
Standard Deviation	17.895	20.907	18.702
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	3.056	4.546	1.241
df	1896	2049	1874
Level of Significance	< 0.01	< 0.01	> 0.10

Table 28 on page 59 indicates that the mean SCREEN score of SN recruits increased significantly from period I to period II and then remained at that level. This is evident because of the insignificant test statistic between periods II and III. However, the change in the mean SCREEN score is significant between periods I and III.

Table 28. MEAN SCREEN SCORES FOR SEAMAN (SN) ACCESSIONS

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	81.702	83.285	83.229
Standard Deviation	11.110	7.072	5.563
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	3.623	0.214	3.782
df	1418	1860	1120
Level of Significance	< 0.01	> 0.10	< 0.01

4. Summary of Findings

There is an observable increase in the number of enlistments into the AN, FN, SN ratings during the time when the SCP was offered. The increased enlistments occurred in all of the AFQT categories for all of the GENDET ratings, except in one instance. The level of AFQT category IIIA enlistments into the SN rating decreased by 7.6 percent during period II.

The increase in the number of enlistments into the FN and SN ratings was greater for blacks than for whites or Hispanics. The number of black men enlisting into the FN rating more than tripled during the time the SCP was offered. The increase in the SN ratings for black males during the same period was about 61 percent.

The more notable increases in enlistments of Hispanic men occurred in the AN and SN ratings. The number of Hispanic enlistments into these ratings more than doubled during period II. The increase in enlistments of Hispanics into the AN rating during this same period was about 41 percent.

The mean AFQT percentile scores increased in all three GENDET ratings during period II. The largest increase occurred in the AN rating, where the mean AFQT score increased by about 10 percent. The mean AFQT percentile score for the SN rating increased by 6.2 percent. The mean AFQT scores between periods I and II for the FN rating were not statistically different from each other.

During period III, following termination of the SCP, the number of enlistments of AFQT categories IIIA to IV continued to increase in the AN and SN ratings. The

changes in the number of AFQT category II AN and SN recruits are nominal (a decrease of 2 and 8, respectively). The number of AFQT category I AN recruits decreased by four (25 percent) in period III. The number of AFQT category I SN recruits increased by one during the same period.

The number of enlistments of young men of all three racial/ethnic groups into the AN and SN ratings continued to increase in period III. The number of enlistments into the FN rating declined for all three groups during the same period. The decline of young black men enlisting was the most notable, at nearly 22 percent.

The mean AFQT percentile scores declined significantly between periods II and III for all three GENDET ratings. The greatest decline is nearly 8 percent in the SN rating. The decrease in mean AFQT percentile scores for the AN and FN ratings was 5.8 and 6.4 percent, respectively. No statistically significant change was found in the mean SCREEN scores of recruits into the three GENDET ratings between periods II and III.

V. DATA BASE, METHODOLOGY, AND FINDINGS OF THE REGRESSION ANALYSIS

A. GENERAL

A multivariate regression model was developed using the Enlistment Market Analysis data base. The time series, cross-sectional data file contained economic and demographic information collected quarterly from each of the 41 NRDs for fiscal 1985 through 1988. It was used to model the number of new enlistment contracts of AFQT category I to IIIA individuals holding a high school diploma and is discussed in greater detail below.

B. CHAPTER ORGANIZATION

This chapter describes the construction of the sample data base, the determinants used in selecting comparisons, the construction of variables, and the development of a model. The remainder of the chapter is a discussion of concerning the findings of the regression analysis.

C. DATA FILE

An econometric model was estimated using the Enlisted Marketing Analysis data base. The purpose of the model was to obtain the elasticities of the explanatory variables and not to forecast contracts. This section describes variable construction, model specification, methodology, and results.

The file contained quarterly data by NRD on the number of new contracts signed by male recruits in AFQT categories I through IIIB. Since the SCP applied to AFQT categories I and II high school diploma graduates, the model considered only new contract enlistments in AFQT categories I through IIIA who possessed a high school diploma. It was not possible to limit the new contracts to AFQT categories I and II using information in the data base.

The military-to-civilian pay ratio for the total NRD labor force rather than for the 17- to 22- year-old population was provided. The recorded unemployment rate was also for the entire labor force rather than for the youth segment of the labor force. Using the pay ratio and unemployment rate for the youth population would have provided a more accurate estimate of their effects. The pay ratio and unemployment rates for the teenage population are generally higher than those for the general population.

D. EXPLANATORY VARIABLES

1. Variables MALEA and PAY

Two explanatory variables were taken directly from the data base and were not modified. The first was the MALEA variable. This variable measures the male population of the NRD who are high school diploma graduates and who have scored in the upper 50th percentile on the AFQT.

The second variable provides a measure of the economic conditions in the NRD. The variable PAY is the military-to-civilian pay ratio. This variable expresses the difference between military and civilian compensation as a ratio.

2. Variable Construction and Modification

Several new variables were constructed and included in the model. The variables created were:

- UNEMP
- ADVI
- BLMAR
- RECRTR
- SCP
- GIBILL

a. Variables UNEMP and ADVI

Two variables were lagged by one quarter (three months). When a variable is lagged, the value of a variable in a previous quarter is used in the estimation of the dependent variable for the current quarter. The unemployment rate was lagged because the decision to enlist is likely to be based, in part, on recent unemployment rates and not necessarily on the current rate. The rate was also lagged because changes in unemployment rates may have an impact for many months in the future [Ref. 36]. The advertising expenditures variable was lagged for similar reasons [Ref. 40].

b. Variable BLMAR

The variable for black men in the population of high school graduates who had AFQT scores in categories I to IIIA was modified to a percentage of the total male population. This construction permitted an examination of the effect of the black proportion of the population on high-quality enlistments.

c. Variable RECRTR

The number of recruiters in each NRD was expressed as a percentage of the total male population.

d. Variables SCP and GIBILL

Two dichotomous variables were created to capture the effect of implementation of certain programs. The first is the variable SCP, which reflects the implementation of the Sea College Program. SCP is equal to one between 1 April 1986 and 4 December 1987. The variable is equal to zero at all other times. The second dichotomous variable created was GIBILL, and its purpose is to reflect the implementation of the Montgomery G.I. Bill on 1 July 1985. Therefore, the variable is equal to one after 1 July 1985 (fourth quarter of fiscal 1985) and is equal to zero otherwise.

E. MODEL SPECIFICATION AND FUNCTIONAL FORM

Based on the results of the literature review, the number of new contracts of high school graduates in AFQT categories I to IIIA (MANC) can be expressed as a function of the explanatory variables described above:

$$MANC = f(UNEMP, PAY, BMAR, ADV1, RECRTR, MALEA, SCP, GIBILL) \quad (5.1)$$

The model is expressed as a log-log relationship in order to take advantage of the constant elasticity properties of the coefficients. In its functional form, the model can be expressed as:

$$\begin{aligned} LOGMANC = {} & \beta_0 + \beta_1 LOGUNEMP + \beta_2 LOGPAY + \beta_3 LOGBMAR + \beta_4 LOGADV1 \\ & + \beta_5 LOGREC + \beta_6 LOGMALEA + \beta_7 SCP + \beta_8 GIBILL + \varepsilon \end{aligned} \quad (5.2)$$

All of the coefficients, except one, are expected to have positive signs. The exception is for the coefficient of LOGBMAR; this coefficient is expected to have a negative sign. The expectation that the coefficient of the black population percentage variable is negative is consistent with the findings of Goldberg and Greenston, where a negative relationship was found [Ref. 37 : pp. 64-80.]. Table 29 on page 64 presents the eight explanatory variables and their expected signs in the regression model.

Table 29. EXPECTED SIGN OF THE REGRESSION EXPLANATORY VARIABLES

Variable	Expected Sign	Variable	Expected Sign
LOGUNEMP	+	LOGREC	+
LOGPAY	−	LOGMALEA	+
LOGBMAR	+	SCP	+
LOGADV1	+	GIBILL	+

F. METHODOLOGY

A preliminary model was examined for evidence of heteroscedasticity, multicollinearity, and autocorrelation among the explanatory variables. Preliminary analysis confirmed the presence of all three conditions. This was not unexpected because of the time series cross-sectional nature of the data base. A discussion of the type of condition, its effect on regression estimates, and the method of detecting each condition is presented below.

Heteroscedasticity exists when the variance disturbance term, μ_i, is no longer constant but is conditional on the value of the explanatory variable. This condition yields biased estimators when using Ordinary Least Squares (OLS) estimation. This condition may result in deriving misleading conclusions when using normal statistical testing techniques [Ref. 47: pp. 316-326].

A preliminary estimation of the model expressed in equation (5.2) was conducted to obtain the necessary statistics to test the data for heteroscedasticity. Heteroscedasticity was examined using Spearman's rank correlation test [Ref. 47: pp. 331-332]. In this test, the Spearman's rank correlation coefficient (r_s) is determined by:

$$r_s = 1 - 6\left[\frac{\sum d_i^2}{N(N^2 - 1)}\right] \tag{5.3}$$

where:

d_i is the difference in the ranks assigned to two different characteristics of the i th individual;

N is the number of observations ranked.

If it is assumed that the population correlation coefficient, ρ_s, is equal to zero, then the significance of r_s can be tested using the t test:

$$\hat{t} = \frac{r_s\sqrt{N-k}}{\sqrt{1-r_s^2}} \tag{5.4}$$

where:

$\hat{t}$ is the t test statistic;

r_s is the Spearman rank correlation coefficient;

N is the number of observations; and

k is the number of regression coefficients, including the intercept term, estimated.

The null hypothesis is that the data are heteroscedastic. The null and alternate hypotheses for the test can be expressed as:

$$H_0: E(\mu_i^2) = \sigma_i^2$$

$$H_a: E(\mu_i^2) \neq \sigma_i^2$$

If $\hat{t}$ is greater than the critical t value, then the hypothesis of heteroscedasticity is accepted. Table 30 on page 66 and Table 31 on page 66 presents the probabilities among the variables that the data are heteroscedastic. If the probability is less than or equal to 0.05, then the data is considered to be heteroscedastic. Each of the variables was found to be heteroscedastic.

Table 30. PROBABILITY OF HETEROSCEDASTICITY AMONG THE VARIABLES

Variable	LOGUNEMP	LOGPAY	LOGBMAR	LOGREC
LOGUNEMP	0.0000	0.5671	0.0436	0.0001
LOGPAY	0.5671	0.0000	0.0001	0.0001
LOGBMAR	0.0436	0.0001	0.0000	0.3468
LOGREC	0.0001	0.0001	0.3468	0.0000
LOGADV1	0.0740	0.3797	0.7499	0.2425
LOGMALEA	0.0001	0.0001	0.8818	0.0001
SCP	0.9640	0.7723	0.3146	0.3047
GIBILL	0.0001	0.0001	0.8229	0.0001

Table 31. PROBABILITY OF HETEROSCEDASTICITY AMONG THE VARIABLES

Variable	LOGADV1	LOGMALEA	SCP	GIBILL
LOGUNEMP	0.0740	0.0001	0.9640	0.0001
LOGPAY	0.3797	0.0001	0.7723	0.0001
LOGBMAR	0.7499	0.8818	0.3146	0.8229
LOGREC	0.2425	0.0001	0.3047	0.0001
LOGADV1	0.0000	0.0001	0.0001	0.0001
LOGMALEA	0.0001	0.0000	0.0001	0.0001
SCP	0.0001	0.0001	0.0000	0.0001
GIBILL	0.0001	0.0001	0.0001	0.0000

Multicollinearity is the presence of a linear relationship among some or all of the explanatory variables of a regression model. Multicollinearity yields regression coefficients that have large standard errors and poor accuracy [Ref. 47: pp. 283-286]. A test for multicollinearity was conducted using a condition number that is defined as the ratio of the maximum to the minimum eigenvalues among the regressors [Ref. 47: pp. 301-302]. A condition number greater than 1,000 is considered to be an indication of severe multicollinearity. The condition number for the preliminary regression model was 2,782.

Autocorrelation is defined, by Gujarati, as "correlation between members of series of observations ordered in time or space" [Ref. 47: pp. 353-354]. Autocorrelation was tested using the Durbin-Watson d statistic [Ref. 47: pp.375-379]. The computed d , or $\hat{d}$, was 1.329 while the critical d statistic at the 0.05 level of significance was 1.697. Therefore, there was evidence that positive autocorrelation existed. OLS estimation in the presence of autocorrelation yields estimates that are linear, unbiased, and consistent, but whose variances are no longer efficient or at a minimum.

The presence of autocorrelation led to the conclusion that the error term of the model was following a first-order autoregressive process [Ref. 48: pp. 448-450]. This process can be expressed as:

$$\varepsilon_t = \rho\varepsilon_{t-1} + \mu_t \tag{5.7}$$

where:

ε_t is the first-order autoregressive error term;

ρ is the autocorrelation parameter;

μ_t is a disturbance term. since:

$$\varepsilon_{t-1} = \rho\varepsilon_{t-2} + \mu_{t-1}$$

then:

$$\varepsilon_t = \rho(\rho\varepsilon_{t-2} + \mu_{t-1}) + \mu_t = \rho^2\varepsilon_{t-2} + \rho\mu_{t-1} + \mu_t$$

and since:

$$\varepsilon_{t-2} = \rho\varepsilon_{t-3} + \mu_{t-2}$$

then:

$$\varepsilon = \rho^3\varepsilon_{t-3} + \rho^2\mu_{t-2} + \rho\mu_{t-1} + \mu_t$$

which can ultimately be expressed as:

$$\varepsilon_t = \sum_{s=0}^{\infty} \rho^s \mu_{t-s} \tag{5.12}$$

This expression states that the first-order autoregressive error term is a linear combination of the current and preceding error terms.

G. REGRESSION ANALYSIS FINDINGS

Estimation of the model was conducted using the SAS procedure TSCSREG, or time series cross-sectional regression. This procedure permits parameter estimates to be studied under one of three error structures. The Parks Method assumes a first-order autoregressive error structure with contemporaneous collinearity between cross-sections and heteroscedasticity in its estimation. When the Parks method is used, the regression parameters are estimated by generalized least squares [Ref. 49].

The model was also estimated using OLS. This was done so that the regression coefficient estimates obtained by one method might be compared to those obtained by the second method. The purpose of this comparison was to determine the range of values for the true SCP elasticity.

1. Model Estimation with LOGPAY as an Explanatory Variable

Table 32 on page 69 presents the results of the regression using the two methods. The regression coefficients are indicated as $\hat{\beta}_i$ and the standard error for each coefficient is also provided. The probability that the coefficient is equal to zero is indicated in the column labeled prob $> |\hat{t}|$. If the value is less than the significance level of 0.05, then the coefficient is considered to be significantly different than zero.

Additionally, the F statistic and the probability of obtaining a greater F statistic are indicated in the table. The F statistic is used to test the hypothesis that all regression coefficients, except the intercept term, are jointly equal to zero. If the probability of obtaining a greater F statistic is less than 0.05, then all the coefficients are jointly significant and different from zero.

The final measure of goodness of fit is the mean square error (MSE). The MSE derives its value from the combined effects of bias and sampling variation of the parameter estimate relative to the true parameter [Ref. 48 : p. 395]. For the regression models, a minimum MSE is desired [Ref. 48: pp.422-425]. The more conventional measures of fit for OLS estimation is provided in the R^2 statistic which is available for the OLS estimates but not for the Parks estimates.

Table 32. RESULTS OF REGRESSION USING OLS AND PARKS METHODS

Variable	OLS Method			Parks Method		
	$\hat{\beta}_i$	Std Err	prob $> \lvert \hat{t} \rvert$	$\hat{\beta}_i$	Std Err	prob $> \lvert \hat{t} \rvert$
INTERCEPT	4.867	0.200	0.0001	5.068	0.044	0.000
LOGUNEMP	0.102	0.043	0.018	0.045	0.007	0.000
LOGPAY	0.159	0.143	0.267	− 0.057	0.026	0.031
LOGBMAR	− 0.046	0.012	0.0002	0.003	0.002	0.155
LOGREC	0.116	0.016	0.0001	0.007	0.004	0.076
LOGADV1	0.002	0.008	0.812	− 0.006	0.001	0.000
LOGMALEA	0.119	0.012	0.0001	0.035	0.002	0.000
SCP	0.071	0.030	0.018	− 0.008	0.005	0.082
GIBILL	0.143	0.039	0.0002	0.173	0.008	0.000
R^2	0.208					
F statistic	21.252					
prob $> F$	0.0001					
MSE	0.091			0.371		
N	656			656		

Table 32 shows that for the OLS estimates, all coefficients are of the expected sign and are significant except for the LOGPAY and the LOGADV1 variables. Additionally, the estimates are jointly significant. The elasticity of the SCP is positive and significant.

The Parks method yields somewhat different results, however. The SCP and LOGPAY are estimated to have a negative effect on new enlistment contracts. The SCP coefficient is no longer significantly different from zero, which is the same as saying that in this model, the SCP has no influence on the enlistment decision. The pay variable is not only negative but has now become significant.

The advertising coefficient also changes signs from positive in the OLS estimates to negative in the Parks method. The black male population rate also changes signs and significance. In the OLS method the rate was negative and significant. That is, as the black male population rate increased, the number of new enlistment contracts is expected to decrease. In the Parks method, the LOGBMAR variable is no longer significant.

Of particular concern was the changing of the sign of the pay variable. It has long been established that as the military-to-civilian wage ratio increased, the number of new contracts could be expected to increase. A review of methodology did not reveal any reason for the change in the sign of this variable. However, discussions with a Navy Recruiting Command representative revealed that the same effect on the pay variable has occurred in their previous analyses. Navy Recruiting Command consequently developed a new pay variable [Ref. 50]. This new pay variable was not available for this research.

2. Model Estimation without LOGPAY as an Explanatory Variable

Based upon Navy Recruiting Command's experience, the pay variable was dropped from the model and the regressions were reestimated. Table 33 presents a comparison of the results for the OLS and Parks estimates. Test statistics in this table perform the same functions as in Table 32 on page 69.

Table 33. RESULTS OF REGRESSION USING OLS AND PARKS METHODS WITHOUT LOGPAY

Variable	OLS Method			Parks Method		
	$\hat{\beta}_i$	Std Err	prob $> \lvert \hat{t} \rvert$	$\hat{\beta}_i$	Std Err	prob $> \lvert \hat{t} \rvert$
INTERCEPT	4.983	0.199	0.0001	5.079	0.042	0.000
LOGUNEMP	0.107	0.043	0.013	0.047	0.007	0.000
LOGBMAR	− 0.047	0.012	0.0002	0.004	0.002	0.023
LOGREC	0.116	0.016	0.0001	0.006	0.003	0.06
LOGADV1	0.002	0.008	0.802	− 0.006	0.001	0.0001
LOGMALEA	0.115	0.012	0.0001	0.034	0.002	0.000
SCP	0.071	0.030	0.018	− 0.009	0.005	0.064
GIBILL	0.150	0.038	0.0001	0.172	0.008	0.000
R^2	0.207					
F statistic	24.103					
prob $> F$	0.0001					
MSE	0.091			0.371		
N	656			656		

The black male variable parameter estimate again changes signs from the OLS method to the Parks method, but remains significant. The advertising coefficient also changes signs, and it too remains significant.

The G.I. Bill parameter estimate in both models, and in using both methods, remains fairly consistent and significant. The elasticity ranges from 0.143 to 0.173, indicating that the G.I. Bill has a positive effect in attracting youth to military service.

The SCP elasticities range from 0 to 0.071. This indicates that the SCP had a slight positive effect in generating new enlistment contracts. This partly explains and confirms the rise in enlistment levels seen in the GENDET ratings. The small magnitude of the coefficient may be attributed to the fact that the SCP was targeted toward a select segment of the youth population.

3. Summary of Findings

The SCP has a positive effect on the number of high-quality (high school diploma graduates who score in AFQT category I through IIIA) new contract enlistments when using OLS estimation. The SCP has a negative effect on new contract enlistments when the model is estimated using Parks method. However, the effect is not statistically significant at the 0.05 level. If the level of significance is changed to 0.10, then the SCP has a negative elasticity of 0.009, or less than 1 percent.

VI. CONCLUSIONS, POLICY IMPLICATIONS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

A. GENERAL

This chapter describes the conclusions drawn as the result of this research. The conclusions are presented categorically in response to the primary and secondary research questions that were posed in Chapter 1. The policy implications of the conclusions are then discussed along with potential areas of future research.

B. CONCLUSIONS

1. The Effect of the SCP on the Targeted Ratings

The primary research question is to evaluate the effect that the SCP may have had on the targeted GENDET ratings of Airman (AN), Fireman (FN), and Seaman (SN). The changes in the number of enlistments in each of the ratings over the three periods is used as a measure of the effect of the SCP. Period I is the period before the SCP was offered; period II refers to when the SCP was offered; and period III refers to the time following termination of the SCP.

Table 17 on page 53, Table 21 on page 55, and Table 25 on page 57 show the changes in the number of enlistments in the three ratings. It is evident that there were substantial changes in the number of enlistments, particularly in the fireman rating. The number of total enlistments for FN increased by about 59 percent between periods I and II and then declined by a little more than 10 percent in period III. This change was spread out over AFQT categories I, II, and IIIA; however, most of the change occurred in category II.

The number of enlistments into the FN rating by AFQT category II youth nearly tripled from period I to period II. The number then decreased by a little more than 36 percent in period III.

Of equal interest is the change in the number of enlistments of AFQT category IIIB FNs, a category not eligible for the SCP. Beginning at a level of 124 enlistments in period I, the number increases by nearly 64 percent in period II and then decreases to 177 enlistments in period III. It cannot be concluded that the increase of AFQT category IIIB recruits reflects a market expansion effect because persons in this group may have been influenced by enlistment programs other than the SCP.

The effect of the SCP on the other two GENDET ratings, while not as dramatic, is notable. The number of AFQT category II SN recruits increased from 130 during period I to 228 in period II. This represents an increase of more than 75 percent. The number of enlistments decreased during period III by only about 3.5 percent.

The least affected of the three ratings is the AN rating. The number of enlistments of AFQT category I recruits did increase from one to 16 between periods I and II, and then decreased 25 percent in period III. However, the small cell sizes in the analysis make it imprudent to draw specific conclusions about the effect of the SCP on enlistments into this rating.

It is concluded that the SCP did have a positive influence on the number of enlistments of AFQT category I and II males into the FN and SN ratings. This conclusion is also supported by the results of the regression of the new contract enlistment model. These results are contained in Table 32 on page 69 and in Table 33 on page 70 The tables show that elasticity of the SCP ranged from zero to about 0.07 when estimating the total number of new contract enlistments of high school graduates who scored in AFQT categories I through IIIA. The positive coefficient of the SCP variable suggests that the SCP partially influenced the changes in the number of enlistments into the GENDET ratings in period II. It is not possible to conclude that the SCP is responsible for all of the changes shown.

2. The Effect of the SCP on the Quality of Enlistments into Targeted Ratings

A secondary research question was to determine if the SCP had any effect on the level of the quality of recruits who enlisted into the targeted ratings. This effect was measured by comparing the mean AFQT percentile scores and the mean SCREEN scores of recruits in each of the three ratings over the three periods. Table 19 on page 54, Table 23 on page 56, and Table 27 on page 58 present the results of the comparison of the mean AFQT percentile scores. Table 20 on page 55, Table 24 on page 57, and Table 28 on page 59 presents the results of the comparison of the mean SCREEN scores. The following discussion summarizes the results of analysis by individual ratings.

a. Changes in the Level of Recruit Quality in the AN rating

Table 19 on page 54 shows that the recruit mean AFQT percentile score increased from about 45 to about 49.5 between periods I and II. This increase in the level of recruit quality was significant at the 0.01 level. Also, the level of recruit quality decreased significantly after the discontinuation of the SCP in period III. There is no statistically significant difference in the level of recruit quality between periods I and II when the SCP was not offered.

The mean SCREEN scores of AN recruits also changed significantly, as seen in Table 20 on page 55. The recruit mean SCREEN score increased significantly between periods I and II; however, it did not change significantly between periods II and III. This indicates that the SCP may have attracted some high-quality recruits, as measured by the SCREEN score, but that discontinuation of the program had little effect on the mean SCREEN score of recruits.

With respect to the AN rating, while the SCP may have had an inconclusive effect on the number of enlistments, it is apparent that the SCP played a role in attracting high-quality male youths into the rating. The recruits who enlisted in period III were no more or less likely to separate from the Navy before completing 12 months of service than those who enlisted in period II, as measured by the mean SCREEN score. Those who enlisted in period II were of a higher quality based on the significantly different mean AFQT percentile scores of the recruits between periods II and III.

b. Changes in the Level of Recruit Quality in the FN Rating

While the most significant changes in the number of enlistments occur in this rating, the changes in the level of quality were hardly significant. The only change that is significant is in the mean AFQT percentile score. Table 23 on page 56 presents this information.

There is no significant difference between the mean AFQT scores of recruits in period I and the scores of recruits in periods II or III. However, there is a significant decrease in the mean AFQT score of recruits who enlisted during period II, when compared to those who enlisted in period III. This may indicate that the SCP did not help to attract high-quality youths into this rating. It may also indicate that when enlistments under the SCP ceased, high-quality youths enlisted into programs other than GENDET FN.

c. Changes in the Level of Recruit Quality in the SN Rating

The SN rating also experienced changes in recruit quality similar to that of the AN rating. Table 27 on page 58 shows that the mean AFQT percentile score of SN recruits increased significantly from about 44 in period I to about 46.7 in period II. The mean score also decreased significantly to about 43 in period III. There is no significant difference between the mean AFQT score in period I and that in period III.

This indicates that during the time that the SCP was offered, a significantly higher quality recruit, as measured by the mean AFQT percentile score, was enlisting. When comparing the level of recruit quality both before and after the period when the SCP was offered, it can be seen that there is no significant difference between the two.

The level of recruit quality, as measured by the mean SCREEN score, is provided in Table 28 on page 59. It can be seen that the recruits who enlisted in period II were significantly less likely to separate before completing 12 months of service than were those who enlisted in period I. Again, as in the AN rating, those who enlisted in period III were no more or less likely to separate prior to completing of 12 months of service than were those in period II. Therefore, there is an increase in the number of enlistments and the level of recruit quality in the SN rating during the time the SCP was offered.

d. Remaining Research Questions

The secondary research questions that remain to be answered deal with the effect that the SCP may have had in the number of enlistments and the level of recruit quality in other enlistment programs and DoD occupational areas. It is not possible to isolate the effect of the SCP on these areas, given the data bases used in this research.

Attempts to analyze the effect of the SCP in these areas resulted in small cell sizes for some of the enlistment programs and occupational areas. It was also not possible for the purposes of this research to account for all of the changes to enlistment program policies. These would have had a profound effect on the number of enlistments and the level of recruit quality into the affected program.

Therefore, no conclusions are made regarding the impact of the SCP on the number of enlistments and the level of recruit quality into these programs and occupational areas. Appendices B through G present the results of analysis for these two areas.

3. Summary of Conclusions

This research suggests that the Navy Sea College Program was reasonably successful in accomplishing the following:

- Attracting youths into the GENDET ratings, particularly into the Fireman (FN) rating. The program helped to attract enlistments into the AN and SN ratings, but to a lesser degree.
- Attracting higher-quality youth into the SN and AN rating. However, the SCP had limited success in influencing the quality of recruits entering the FN rating.
- Generating new contract enlistments, based upon the regression of the enlistment model.

C. POLICY IMPLICATIONS OF THE CONCLUSIONS

Since the Navy Sea College Program appears to have been successful in generating enlistments, certain decisions must be made as to future applications of similar pro-

grams. The issues can be divided into three broad categories. The three categories are program eligibility, program applicability, and program cost.

Navy manpower planners will have to decide on what type of recruit is desired. The decision to limit program eligibility to persons in AFQT categories I and II may result in underrepresentation of racial and ethnic minorities.

In addition, Navy manpower planners will have to decide whether the purpose of a future educational benefits program should be to attract highly qualified recruits or act as a skill channeler or, accomplish both. The SCP showed that, while it was able to increase the enlistment level in the FN rating, it was also able to raise the level of recruit quality in the SN and AN ratings. Therefore, military manpower planners will have to decide if one or the other purpose should receive the greater emphasis.

Finally, the potential value of a future educational benefit program will have to measured in terms of both its costs and its benefits. This may become particularly important in the face of budget retrenchment. It was not possible to measure this effect within the scope of this research.

D. OPPORTUNITIES FOR FURTHER RESEARCH

This research represents an initial effort to understand the effect of the Sea College Program. As such, it tends to raise more questions than it answers. Some of these questions include:

- Was the SCP cost-effective? This would require tracking the SCP enlistees once they leave the Navy and begin using their benefits.
- Did the SCP have any effect on relieving manpower shortages in critical skill ratings? This would require that the SCP recruit be tracked from completion of general apprenticeship training through advancement to pay grades E-4 or E-5.
- How effective was advertising for the SCP? There is little known about the how the SCP was advertised and whether the advertising was effective. This may be important because possible budget limitations in the future may require that greater fiscal care be exercised by all participants in the enlistment process.
- How effective was the SCP, compared with other enlistment programs, in attracting recruits? This might be limited to comparing the SCP with other programs that enlisted recruits into the reserves.
- How many SCP enlistees did not complete their first term of enlistment?
- How many recruits who entered the Navy during the time the SCP was offered knew of the benefit program and yet enlisted into some other program? This might give some indication of the market expansion effect of the program.
- Is it possible to design a test program that would accurately measure the effect of an educational benefits program on enlistments while ensuring that the educational

assistance program provides equal access to all potential recruits? This means designing a test that does not give the appearance to an outsider of being a test.

The value of an educational benefit program for increasing the enlistment of high-quality young men and women has been shown time and again, not only in surveys of youths and new recruits, but also in empirical studies of the Army College Fund. A well-developed and carefully managed successor to the Navy Sea College Program would serve as a valuable recruiting tool for the Navy into the 1990s.

APPENDIX A. COMPOSITION OF DOD OCCUPATIONAL CODE BY NAVY RATING

DoD Occupational Area Code	Title	Navy Ratings
0	Infantry, Gun Crew, and Seamanship Specialties	AN, BM, GM, GMG, GMM, QM, SN
1	Electronic Equipment Repairers	AX, AT, AQ, DS, ET, FC, FT, FTB, FTG, MT, OTA, OTM, ST, STG, STS, TM, TD
2	Communications and Intelligence Specialists	AC, AW, CT, EW, OS, OT, RM, SM
3	Health Care Specialists	DN, DT, HM, HN
4	Other Technical and Allied Specialists	AG, DM, MU, PH
5	Functional Support and Administration	AZ, AK, DP, DK, IS, JO, LN, NC, PN, PC, RP, SK, YN
6	Electrical/Mechanical Equipment Repairers	AB, ABE, ABF, ABH, AE, AD, AO, AM, AME, AMH, AMS, AS, ASE, ASM, BT, CM, EM, EN, FN, GS, GSE, GSM, IM, IC, MM, MN, OM, WT
7	Craftsmen	BU, CE, CN, DC, EA, EO, HT, LI, MR, ML, PM, SW, UT
8	Service and Supply Handlers	PR, MA, MS, SH
9	Non-Occupational	Students, Patients, Prisoners

APPENDIX B. NUMBER OF ENLISTMENTS INTO RECRUITING PROGRAMS OTHER THAN GENDET RATINGS AND THE SEA COLLEGE PROGRAM

Enlistment into the Advanced Electronics Field (AEF) Program by AFQT Category

AFQT Category	Period I	Period II	Period III
I	17	66	86
II	339	511	716
IIIA	97	150	213
IIIB	27	36	48
IV	0	0	0
Total Number of Enlistments	480	763	1063
χ^2	2096	3413	4960
CC	0.559	0.570	0.565

Enlistment into the Active Mariner (AM) Program by AFQT Category

AFQT Category	Period I	Period II	Period III
I	7	14	11
II	125	167	161
IIIA	133	126	123
IIIB	114	116	160
IV	9	11	24
Total Number of Enlistments	388	434	479
χ^2	2096	3413	4960
CC	0.559	0.570	0.565

Enlistment into the Advanced Technical Field (ATF) Program by AFQT Category

AFQT Category	Period I	Period II	Period III
I	13	14	21
II	88	83	174
IIIA	12	31	48
IIIB	3	1	15
IV	0	0	1
Total Number of Enlistments	116	129	259
χ^2	2096	3413	4960
CC	0.559	0.570	0.565

Enlistment into the Apprenticeship Training (ATP) Program by AFQT Category

AFQT Category	Period I	Period II	Period III
I	5	8	9
II	55	112	109
IIIA	110	156	178
IIIB	226	394	548
IV	174	262	379
Total Number of Enlistments	570	932	1223
χ^2	2096	3413	4960
CC	0.559	0.570	0.565

Enlistment into the Nuclear Field (NF) Program by AFQT Category

AFQT Category	Period I	Period II	Period III
I	90	141	219
II	294	362	581
IIIA	8	16	16
IIIB	1	1	0
IV	0	0	0
Total Number of Enlistments	393	520	816
χ^2	2096	3413	4960
CC	0.559	0.570	0.565

Enlistment into the Seafarer (SF) Program by AFQT Category

AFQT Category	Period I	Period II	Period III
I	10	12	25
II	167	191	304
IIIA	199	223	345
IIIB	378	483	693
IV	266	329	498
Total Number of Enlistments	1020	1238	1865
χ^2	2096	3413	4960
CC	0.559	0.570	0.565

Enlistment into the School Guarantee (SG) Program by AFQT Category

AFQT Category	Period I	Period II	Period III
I	30	46	76
II	460	599	977
IIIA	416	661	1180
IIIB	507	912	1479
IV	72	137	259
Total Number of Enlistments	1485	2355	3971
χ^2	2096	3413	4960
CC	0.559	0.570	0.565

Enlistment into the TAR Enlisted Program (TEP) Program by AFQT Category

AFQT Category	Period I	Period II	Period III
I	4	3	5
II	30	74	69
IIIA	35	70	45
IIIB	24	45	40
IV	1	5	2
Total Number of Enlistments	94	197	161
χ^2	2096	3413	4960
CC	0.559	0.570	0.565

Enlistment into the Five Year Obligation (5YO) Program by AFQT Category

AFQT Category	Period I	Period II	Period III
I	2	10	9
II	27	96	121
IIIA	19	70	104
IIIB	20	74	119
IV	4	2	13
Total Number of Enlistments	72	245	366
χ^2	2096	3413	4960
CC	0.559	0.570	0.565

APPENDIX C. MEAN AFQT PERCENTILE AND SCREEN SCORES OF RECRUITS BY ENLISTMENT PROGRAM

Mean AFQT Percentile Scores for Advanced Electronics Field (AEF) Program Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	72.18	74.11	73.77
Standard Deviation	13.13	13.84	13.31
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	2.471	0.521	2.197
df	1057	1603	936
Level of Significance	< 0.05	> 0.10	< 0.05

Mean SCREEN Scores for Advanced Electronics Field (AEF) Program Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	88.70	88.50	83.56
Standard Deviation	2.94	3.11	4.87
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.180	0.374	0.681
df	1060	1801	1418
Level of Significance	> 0.10	> 0.10	> 0.10

Mean AFQT Percentile Scores for Active Mariner (AM) Program Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	58.11	59.93	57.35
Standard Deviation	16.47	17.53	18.55
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.532	2.155	0.635
df	818	909	858
Level of Significance	> 0.10	< 0.05	> 0.10

Mean SCREEN Scores for Active Mariner (AM) Program Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	85.54	85.57	85.70
Standard Deviation	4.99	5.42	5.06
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.084	0.392	0.486
df	819	886	834
Level of Significance	> 0.10	> 0.10	> 0.10

Mean AFQT Percentile Scores for Advanced Technical Field (ATF) Program Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	77.10	75.38	73.08
Standard Deviation	12.02	13.12	14.09
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.068	1.589	2.834
df	243	273	257
Level of Significance	> 0.10	> 0.10	< 0.01

Mean SCREEN Scores for Advanced Technical Field (ATF) Program Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	88.09	88.08	88.11
Standard Deviation	3.99	3.43	3.81
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.020	0.070	0.039
df	228	281	212
Level of Significance	> 0.10	> 0.10	> 0.10

Mean AFQT Percentile Scores for Apprenticeship Training (ATP) Program Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	42.29	42.38	40.91
Standard Deviation	16.33	16.79	15.68
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.095	2.065	1.690
df	1229	1930	1071
Level of Significance	> 0.10	< 0.05	< 0.10

Mean SCREEN Scores for Apprenticeship Training (ATP) Program Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	83.01	82.94	83.22
Standard Deviation	4.56	4.55	4.38
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.306	1.417	0.884
df	1201	1964	1071
Level of Significance	> 0.10	> 0.10	> 0.10

Mean AFQT Percentile Scores for Nuclear Field (NF) Program Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	84.67	85.85	86.17
Standard Deviation	9.32	9.56	8.90
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.873	0.614	2.662
df	855	1046	743
Level of Significance	< 0.10	> 0.10	< 0.01

Mean SCREEN Scores for Nuclear Field (NF) Program Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	90.32	90.37	90.33
Standard Deviation	1.50	1.63	4.73
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.554	0.261	0.058
df	876	1087	1092
Level of Significance	> 0.10	> 0.10	> 0.10

Mean AFQT Percentile Scores for Seafarer (SF) Program Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	45.43	44.93	45.57
Standard Deviation	17.66	18.07	18.49
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.662	0.949	0.193
df	2192	2692	2179
Level of Significance	> 0.10	> 0.10	> 0.10

Mean SCREEN Scores for Seafarer (SF) Program Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	81.19	81.53	82.05
Standard Deviation	13.22	12.15	10.69
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.640	1.223	1.792
df	2094	2413	1755
Level of Significance	> 0.10	> 0.10	< 0.10

Mean AFQT Percentile Scores for School Guarantee (SG) Program Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	56.33	53.95	53.87
Standard Deviation	17.61	17.58	17.49
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	4.077	0.182	4.603
df	3151	4922	2646
Level of Significance	< 0.01	> 0.10	< 0.01

Mean SCREEN Scores for School Guarantee (SG) Program Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	84.88	84.64	84.81
Standard Deviation	5.94	6.14	5.78
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.120	1.112	0.365
df	3232	4710	2600
Level of Significance	> 0.10	> 0.10	> 0.10

Mean AFQT Percentile Scores for TAR Enlisted Program (TEP) Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	59.91	60.51	61.57
Standard Deviation	15.98	16.3	18.01
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.294	0.546	0.733
df	186	326	214
Level of Significance	> 0.10	> 0.10	> 0.10

Mean SCREEN Scores for TAR Enlisted Program (TEP) Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	84.86	85.02	86.18
Standard Deviation	5.48	5.45	5.12
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.224	2.081	1.898
df	182	349	184
Level of Significance	> 0.10	< 0.05	< 0.10

Mean AFQT Percentile Scores for Five Year Obligation (5YO) Program Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	57.93	60.81	58.24
Standard Deviation	16.38	18.34	18.03
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.274	1.719	0.136
df	128	517	108
Level of Significance	> 0.10	< 0.10	> 0.10

Mean SCREEN Scores for Five Year Obligation (5YO) Program Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	85.14	85.48	85.39
Standard Deviation	4.93	4.97	5.40
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.512	0.198	0.394
df	116	552	107
Level of Significance	> 0.10	> 0.10	> 0.10

APPENDIX D. ENLISTMENTS OF RACIAL/ETHNIC GROUPS BY ENLISTMENT PROGRAM

Enlistments by Racial Ethnic Group into the Advanced Electronics Field (AEF) Program

Racial Ethnic Group	Period I	Period II	Period III
White	431	704	962
Black	31	39	72
Hispanic	21	34	86

Enlistments by Racial Ethnic Group into the Active Mariner (AM) Program

Racial Ethnic Group	Period I	Period II	Period III
White	321	367	371
Black	47	59	93
Hispanic	26	31	34

Enlistments by Racial Ethnic Group into the Advanced Technical Field (ATF) Program

Racial Ethnic Group	Period I	Period II	Period III
White	108	118	229
Black	5	6	21
Hispanic	3	7	29

Enlistments by Racial/Ethnic Group into the Apprenticeship Training (ATP) Program

Racial/Ethnic Group	Period I	Period II	Period III
White	422	586	795
Black	124	310	385
Hispanic	46	84	110

Enlistments by Racial/Ethnic Group into the Nuclear Field (NF) Program

Racial/Ethnic Group	Period I	Period II	Period III
White	366	492	760
Black	15	14	37
Hispanic	20	28	52

Enlistments by Racial/Ethnic Group into the Seafarer (SF) Program

Racial/Ethnic Group	Period I	Period II	Period III
White	754	822	1208
Black	217	359	548
Hispanic	77	124	190

Enlistments by Racial/Ethnic Group into the School Guarantee (SG) Program

Racial/Ethnic Group	Period I	Period II	Period III
White	1212	1778	2986
Black	206	499	838
Hispanic	91	233	381

Enlistments by Racial Ethnic Group into the TAR Enlisted Program (TEP)

Racial Ethnic Group	Period I	Period II	Period III
White	82	171	139
Black	10	21	16
Hispanic	5	15	8

Enlistments by Racial Ethnic Group into the Five Year Obligation (5YO) Program

Racial Ethnic Group	Period I	Period II	Period III
White	60	211	288
Black	7	27	61
Hispanic	8	18	34

APPENDIX E. NUMBER OF ENLISTMENTS BY DOD OCCUPATIONAL AREA CODE

Enlistment into DoD Occupational Area Code 0

AFQT Category	Period I	Period II	Period III
I	14	44	40
II	238	520	487
IIIA	333	401	486
IIIB	634	889	1213
IV	444	590	878
Total Number of Enlistments	1663	2444	3104
χ^2	1731	2165	3446
CC	0.522	0.483	0.496

Enlistment into DoD Occupational Area Code 1

AFQT Category	Period I	Period II	Period III
I	14	61	87
II	354	545	763
IIIA	113	175	266
IIIB	34	72	83
IV	0	2	0
Total Number of Enlistments	515	855	1199
χ^2	1731	2165	3446
CC	0.522	0.483	0.496

Enlistment into DoD Occupational Area Code 2

AFQT Category	Period I	Period II	Period III
I	15	25	35
II	154	250	393
IIIA	113	188	358
IIIB	96	178	265
IV	16	29	46
Total Number of Enlistments	394	670	1097
χ^2	1731	2165	3446
CC	0.522	0.483	0.496

Enlistment into DoD Occupational Area Code 3

AFQT Category	Period I	Period II	Period III
I	6	9	16
II	74	76	131
IIIA	44	76	131
IIIB	76	138	217
IV	5	13	22
Total Number of Enlistments	205	312	517
χ^2	1731	2165	3446
CC	0.522	0.483	0.496

Enlistment into DoD Occupational Area Code 4

AFQT Category	Period I	Period II	Period III
I	2	1	1
II	9	18	33
IIIA	3	14	19
IIIB	0	3	3
IV	0	0	0
Total Number of Enlistments	14	36	56
χ^2	1731	2165	3446
CC	0.522	0.483	0.496

Enlistment into DoD Occupatioanl Area Code 5

AFQT Category	Period I	Period II	Period III
I	11	15	19
II	112	154	209
IIIA	94	122	152
IIIB	32	73	124
IV	4	9	11
Total Number of Enlistments	253	373	515
χ^2	1731	2165	3446
CC	0.522	0.483	0.496

Enlistment into DoD Occupational Area Code 6

AFQT Category	Period I	Period II	Period III
I	26	26	48
II	260	303	497
IIIA	181	302	480
IIIB	224	383	666
IV	21	59	137
Total Number of Enlistments	712	1073	1828
χ^2	1731	2165	3446
CC	0.522	0.483	0.496

Enlistment into DoD Occupational Area Code 7

AFQT Category	Period I	Period II	Period III
I	0	5	4
II	36	35	61
IIIA	48	51	106
IIIB	58	97	123
IV	12	6	15
Total Number of Enlistments	154	194	309
χ^2	1731	2165	3446
CC	0.522	0.483	0.496

Enlistment into DoD Occupational Area Code 8

AFQT Category	Period I	Period II	Period III
I	1	1	1
II	20	32	38
IIIA	34	69	73
IIIB	95	139	239
IV	19	19	48
Total Number of Enlistments	169	260	399
χ^2	1731	2165	3446
CC	0.522	0.483	0.496

APPENDIX F. MEAN AFQT PERCENTILE AND SCREEN SCORES OF RECRUITS BY DOD OCCUPATIONAL AREA CODES

Mean AFQT Percentile Scores for DoD Occupational Area Code 0 Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	44.7	47.46	44.55
Standard Deviation	17.28	19.86	18.41
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	4.702	5.591	0.304
df	3867	5047	3588
Level of Significance	< 0.01	< 0.01	> 0.10

Mean SCREEN Scores for DoD Occupational Area Code 0 Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	82.07	83.47	83.25
Standard Deviation	10.6	6.87	6.35
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	4.751	1.223	4.160
df	2604	5039	2317
Level of Significance	< 0.01	> 0.10	< 0.01

Mean AFQT Percentile Scores for DoD Occupational Area Code 1 Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	71.23	71.84	72.27
Standard Deviation	13.6	14.83	14.2
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.782	0.663	1.441
df	1157	1790	1013
Level of Significance	> 0.10	> 0.10	> 0.10

Mean SCREEN Scores for DoD Occupational Area Code 1 Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	88.2	88.13	87.9
Standard Deviation	5.24	3.77	6.34
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.261	1.024	1.012
df	836	1994	1165
Level of Significance	> 0.10	> 0.10	> 0.10

Mean AFQT Percentile Scores for DoD Occupational Area Code 2 Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	60.8	59.64	59.60
Standard Deviation	18.3	18.15	17.63
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.018	0.043	1.142
df	817	1384	673
Level of Significance	> 0.10	> 0.10	> 0.10

Mean SCREEN Scores for DoD Occupational Area Code 2 Program Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	85.36	84.34	85.49
Standard Deviation	5.44	11.5	5.93
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.941	2.388	0.399
df	1023	892	753
Level of Significance	< 0.10	< 0.05	> 0.10

Mean AFQT Percentile Scores for DoD Occupational Area Code 3 Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	57.93	53.88	54.25
Standard Deviation	18.22	18.53	18.38
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	2.451	0.276	2.439
df	442	652	378
Level of Significance	< 0.05	> 0.10	< 0.05

Mean SCREEN Scores for DoD Occupational Area Code 3 Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	85.42	85.25	84.65
Standard Deviation	7.44	4.75	8.79
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.298	1.278	1.198
df	313	818	439
Level of Significance	> 0.10	> 0.10	> 0.10

Mean AFQT Percentile Scores for DoD Occupational Area Code 4 Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	73.14	66.55	69.6
Standard Deviation	12.75	13.37	13.69
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.618	1.052	0.912
df	25	76	21
Level of Significance	> 0.10	> 0.10	> 0.10

Mean SCREEN Scores for DoD Occupational Area Code 4 Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	88.28	86.25	86.73
Standard Deviation	5.09	4.96	5.53
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.278	0.428	1.004
df	23	80	22
Level of Significance	> 0.10	> 0.10	> 0.10

Mean AFQT Percentile Scores for DoD Occupational Area Code 5 Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	65.3	63.09	62.39
Standard Deviation	15.02	17.51	17.62
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.696	0.581	2.378
df	591	804	581
Level of Significance	< 0.10	> 0.10	< 0.05

Mean SCREEN Scores for DoD Occupational Area Code 5 Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	84.73	84.35	85.61
Standard Deviation	5.83	6.66	6.56
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.234	0.578	1.884
df	585	795	560
Level of Significance	> 0.10	> 0.10	< 0.10

Mean AFQT Percentile Scores for DoD Occupational Area Code 6 Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	59.39	55.49	54.59
Standard Deviation	18.5	18.27	18.55
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	4.386	1.272	5.866
df	1510	2278	1304
Level of Significance	< 0.01	> 0.10	< 0.01

Mean SCREEN Scores for DoD Occupational Area Code 6 Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	85.84	87.76	85.18
Standard Deviation	5.76	6.82	6.68
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	3.613	1.627	2.468
df	1682	2216	1498
Level of Significance	< 0.01	> 0.10	< 0.05

Mean AFQT Percentile Scores for DoD Occupational Area Code 7 Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	52.26	51.03	52.73
Standard Deviation	16.14	16.22	15.72
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.704	1.159	0.300
df	329	401	299
Level of Significance	> 0.10	> 0.10	> 0.10

Mean SCREEN Scores for DoD Occupational Area Code 7 Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	85.18	82.76	82.71
Standard Deviation	4.72	11.61	12.82
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	2.646	0.039	2.995
df	267	440	432
Level of Significance	< 0.01	> 0.10	< 0.01

Mean AFQT Percentile Scores for DoD Occupational Area Code 8 Accessions

AFQT	Period I	Period II	Period III
Mean AFQT Percentile Score	45.83	47.29	44.49
Standard Deviation	15.18	14.07	14.8
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	1.000	2.444	0.969
df	339	573	309
Level of Significance	> 0.10	< 0.05	> 0.10

Mean SCREEN Scores for DoD Occupational Area Code 8 Accessions

SCREEN	Period I	Period II	Period III
Mean SCREEN Scores:	83.91	83.5	83.7
Standard Deviation	4.42	5.17	4.53
Test of Means	Between Period I and Period II	Between Period II and Period III	Between Period I and Period III
$\hat{t}$	0.901	0.523	0.527
df	396	501	324
Level of Significance	> 0.10	> 0.10	> 0.10

APPENDIX G. ENLISTMENTS OF RACIAL/ETHNIC GROUPS BY DOD OCCUPATIONAL AREA CODE

Enlistments by Racial/Ethnic Group into DoD Occupational Area Code 0

Racial/Ethnic Group	Period I	Period II	Period III
White	1237	1649	2010
Black	352	694	927
Hispanic	128	234	302

Enlistments by Racial Ethnic Group into DoD Occupational Area Code 1

Racial Ethnic Group	Period I	Period II	Period III
White	459	777	1065
Black	29	50	93
Hispanic	29	51	106

Enlistments by Racial Ethnic Group into DoD Occupational Area Code 2

Racial/Ethnic Group	Period I	Period II	Period III
White	313	527	855
Black	61	131	214
Hispanic	32	64	94

Enlistments by Racial Ethnic Group into DoD Occupational Area Code 3

Racial Ethnic Group	Period I	Period II	Period III
White	160	216	364
Black	31	83	130
Hispanic	20	29	61

Enlistments by Racial/Ethnic Group into DoD Occupational Area Code 4

Racial Ethnic Group	Period I	Period II	Period III
White	13	32	49
Black	1	4	5
Hispanic	0	0	10

Enlistments by Racial Ethnic Group into DoD Occupational Area Code 5

Racial/Ethnic Group	Period I	Period II	Period III
White	207	266	374
Black	38	99	117
Hispanic	8	31	57

Enlistments by Racial/Ethnic Group into DoD Occupational Area Code 6

Racial/Ethnic Group	Period I	Period II	Period III
White	626	911	1433
Black	61	127	292
Hispanic	37	111	169

Enlistments by Racial/Ethnic Group into DoD Occupational Area Code 7

Racial/Ethnic Group	Period I	Period II	Period III
White	140	181	278
Black	5	4	18
Hispanic	5	8	9

Enlistments by Racial Ethnic Group into DoD Occupational Area Code 8

Racial Ethnic Group	Period I	Period II	Period III
White	116	157	215
Black	48	96	173
Hispanic	9	22	22

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6.	U.S. Department of the Navy Office of the Chief of Naval Operations (OP 136) Washington D.C. 20350-2000	2
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